THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXVIII. No. 1743.] LONDON, OCTOBER 6, 1896. [48TH YEAR. PRICE 6d.

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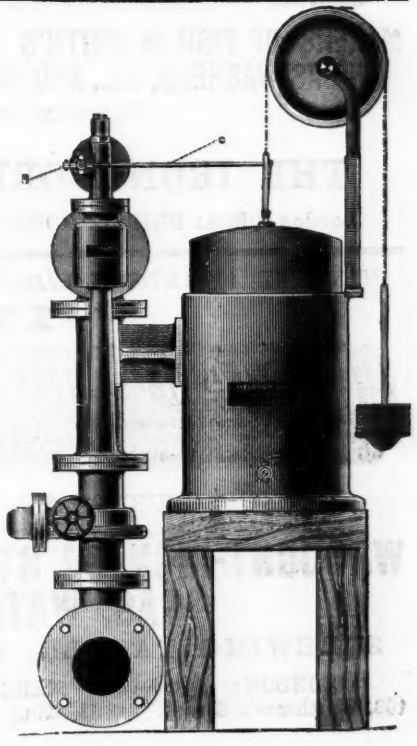

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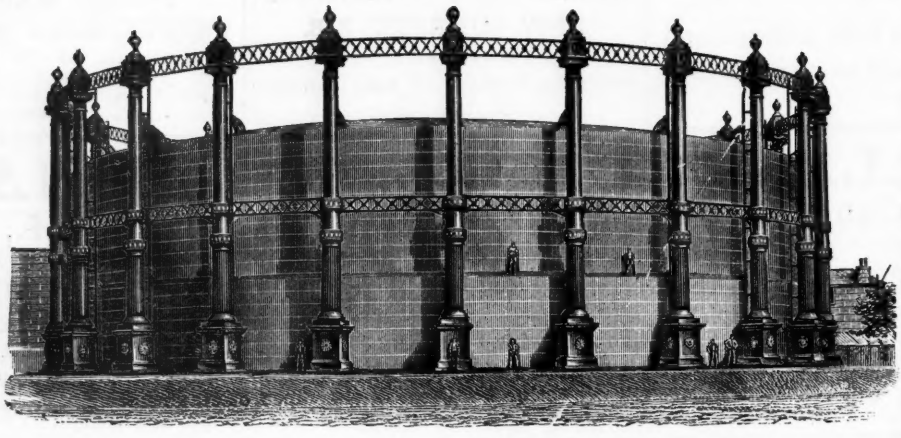

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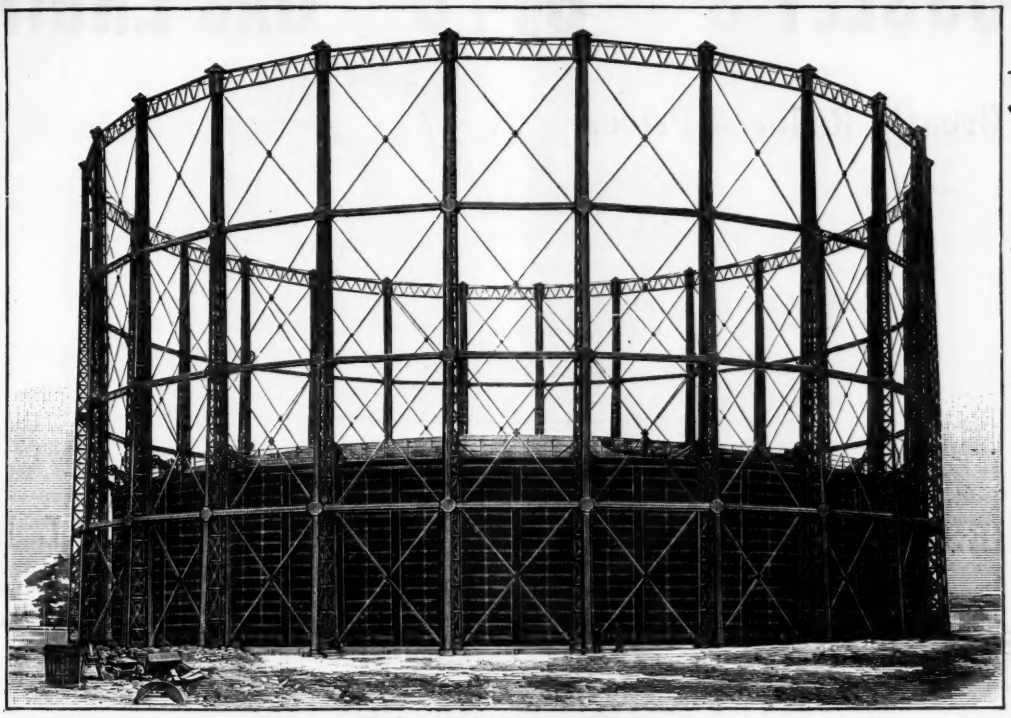

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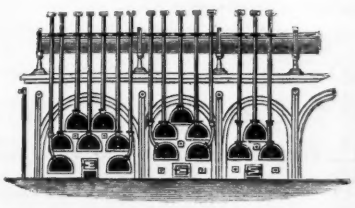

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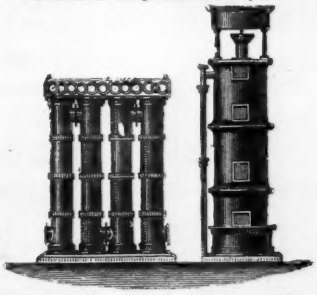

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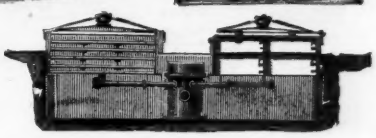

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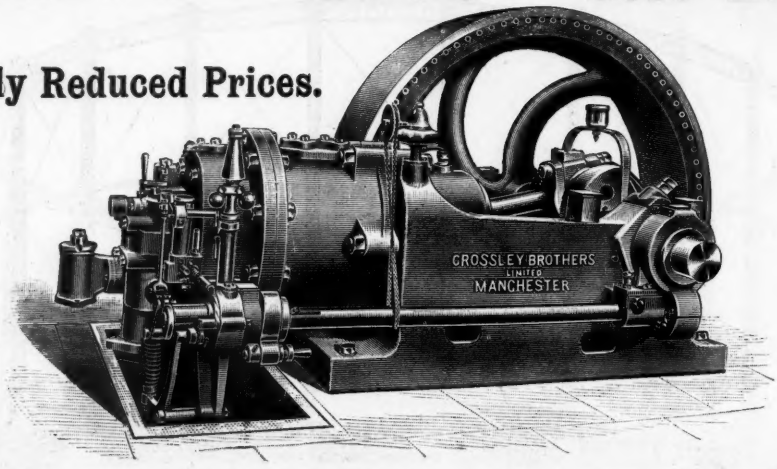

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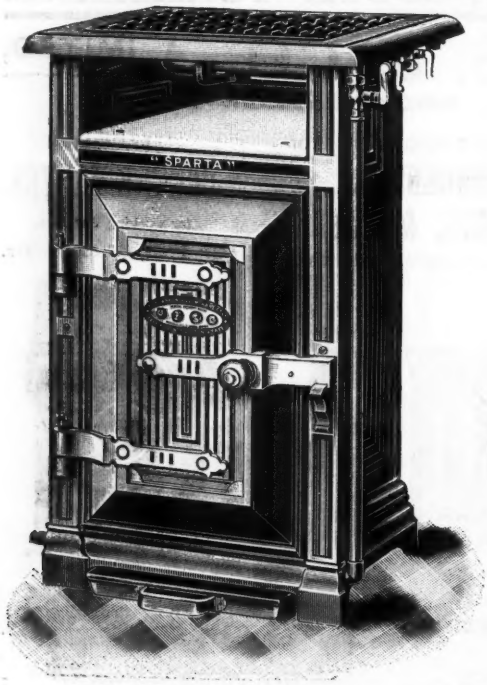

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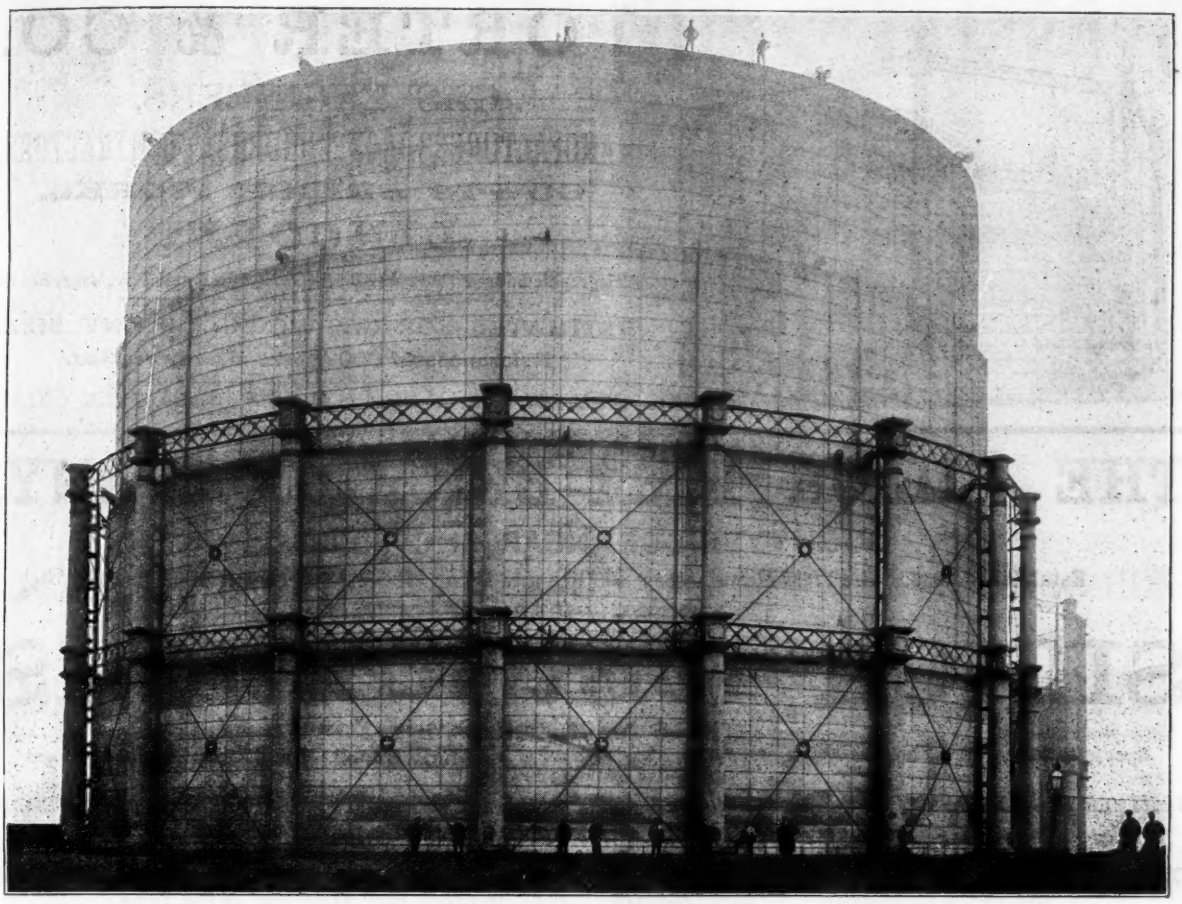

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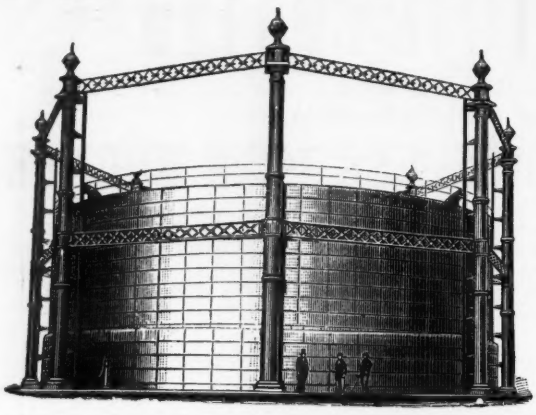

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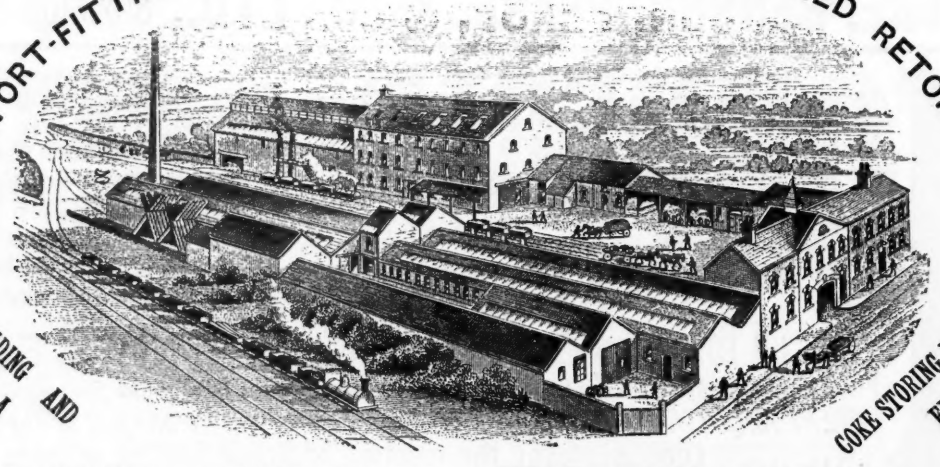

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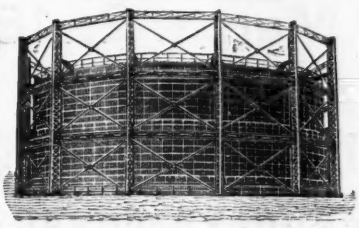

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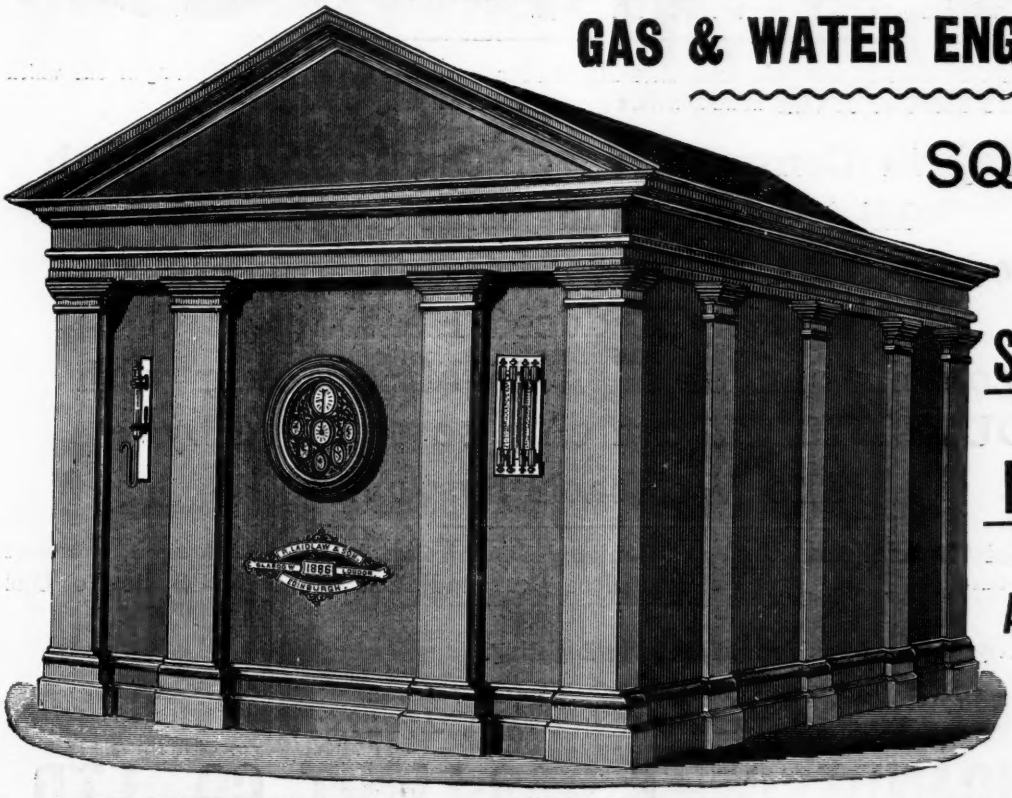

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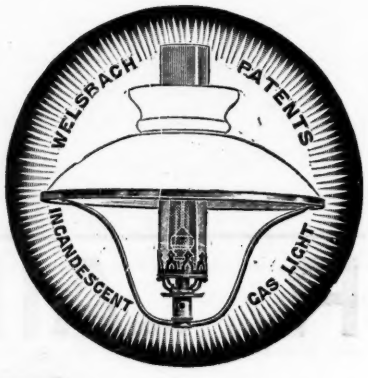

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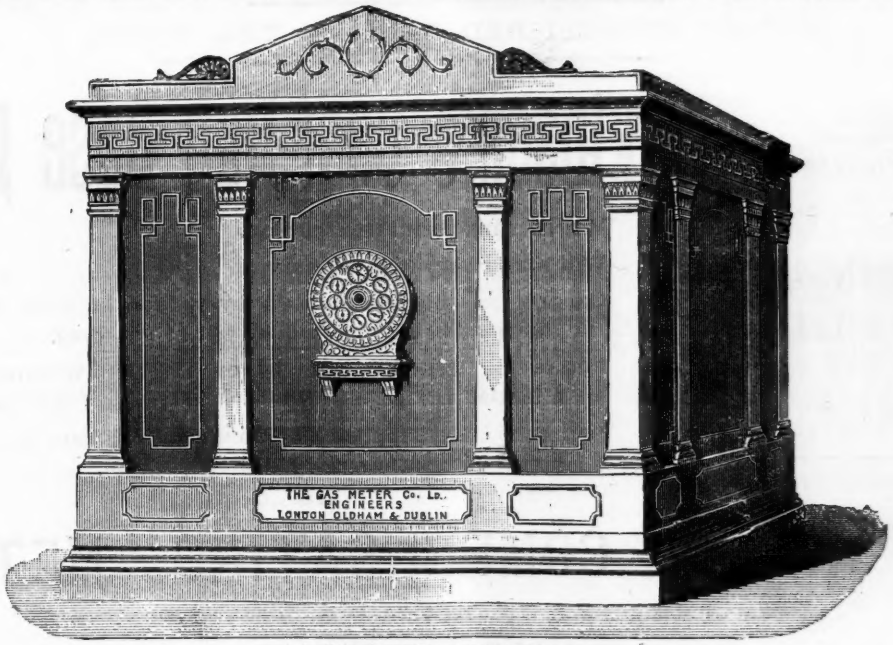

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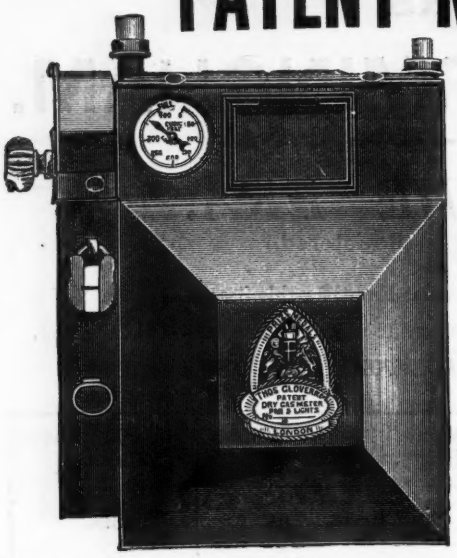

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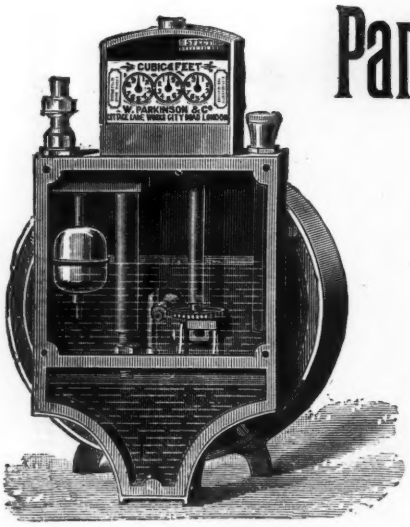

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EDITORIAL NOTES.

Mr. Leonard Courtney on Collectivity.

INTEREST in the proceedings of the Economic Science Section of the British Association in Liverpool was diminished by the absence of the President, Mr. Leonard Courtney, who should have delivered the Inaugural Address on the chief subject included in the Section. The address was read for the author by the Acting President, Mr. L. L. Price; and it opened with a defence of the late Professor Jevons, who went to his grave with the reputation of having predicted the speedy exhaustion of the British coal-fields upon inconclusive evidence. Mr. Courtney said that, in truth, Professor Jevons never predicted this; but the grave warning he gave of the absolute impossibility of continuing the existing rate of the development of the coal supply, and the increasing difficulty of maintaining a prosperity based on the relative advantages we possess in the low cost of production of coal, had been amply verified in subsequent years. Mr. Courtney found little matter for congratulation on the part of economists in the course of legislation and the trend of public sentiment since the Association previously met in Liverpool. Now as then, the economist is as one crying in the wilderness to a people who are more prone to call him names and to misunderstand than to follow his advice for the curing of the ills of the body politic. Mr. Courtney seemed to look to the beginning of the present reign as the Golden Age of the study of political economy, which, he said, had then "worked itself free from earlier errors, and "it had come to be believed that the secret of social "regeneration lay in the utmost allowance of freedom of "action to every individual of the community (so far, at "least, as that action affected himself), coupled with the "most complete development of the principle of self-"reliance." Since this period, according to Mr. Courtney, a change for the worse has come to pass. It seems, however, that he did not allow sufficiently, while lamenting the popular disregard of economics, for the influence of those "earlier errors" which disgusted humane people with the cast-iron economics of the Ricardean school. Of a truth, the acknowledged necessity for the Factory Acts, opposed as these were by the orthodox economists of the day, did more to discredit the "science" they professed than all the efforts of their followers have since been able to effect for its rehabilitation.

Passing from history, Mr. Courtney spoke of "the "movement for the community itself to engross some "forms of industrial activity, and to undertake in respect "of them to meet the wants of their inhabitants." This is an illustration of Collectivity—"an ideal which looked "in the future for regulated civil and national monopolies "instead of unrestricted freedom of individual activity, "and for the supervision and control of those industries "which might remain unabsorbed by State or town." Upon the alternative of inchoate Individualism, Mr. Courtney would not descend. "Liberty of individual "development must be supported by large measures of co-"operative action. No individual could protect himself "by himself against the chances of the future; but "freedom and activity of association were in no way incon-"sistent with the fullest theory of individual responsi-"bility." The world enters on comparatively new ground on turning to the proposals that a larger number of industries should be undertaken by State or by Municipality, and that a minimum and not inadequate subsistence should be assured to all engaged in such industries. These ideas involve a complete reorganization of society. But the past has not been so good that we can refuse to look at any proposals, however strange, offering better promise for the future. Mr. Courtney referred to the municipalization of gas and water supply; but he seemed to think that the margin of possible extension of the same movement is very narrow. It is the consideration of expediency that determines action in this direction; and there is danger lest pressure should be exerted to do away with invasive competition with a municipalized service—thus preventing the operation of a powerful cause of improvement. It is comparatively easy to nationalize property that has been in private hands. Confiscation will do it; but it is in the subsequent development of the scheme of nationalized and municipalized industries that difficulties arise not so easy of solution. Who is to order these things

for the best, under socialistic conditions? Mr. Courtney remarked that, however much they might contemplate the reconstruction of an industrial system, it must, if it was to be a living social organism, be constantly responsive to the ever-changing conditions of growth. "Some "parts must wax while others wane; manifesting at "every moment those phenomena of vigour and de- "cline which characterize life. In the development "of industry, new and easier ways are constantly "being invented of doing old things; places are being "discovered better suited for old industries than those "to which resort has been made; there is a continuous "supersession of the worth of known processes and of the "utility of old forms of work. All these things compel a "perpetual shifting of seats of industry and of the settle- "ments of man; and no organization can be entertained as "practicable which does not lend itself to these necessities." It is in this respect that the remedy of Collectivity fails. Socialism makes no provision for forces which should bring about that movement upon which growth depends.

After all, political economy holds its ground; and the best hope lies in the fuller acceptance of its ideals. Yet there is no inhumanity in economics, which simply consists in the systematizing of facts and drawing deductions from them. Slow, in every case, said Mr. Courtney, must be the secular progress of any branch of the human family. But if they took their stand upon facts, if they were animated by the single purpose of subordinating their investigations and actions to the lifting up of the standard of living, they might possess their souls in patience, waiting on the promise of the future. Certainly, while professed Socialists seem to pin their hopes for the future upon such trivial matters as monopolize their care in the present, the political economist may regard and pass, without reasoning with them.

The Affairs of the Commercial Gas Company.

THE meeting of the Commercial Gas Company last Thursday was very short; and the proceedings were not marked by any notable incident. The Chairman, Mr. J. Blacket Gill, made a somewhat despondent speech, in a more than usually lugubrious tone and manner; excusing himself by referring to the unsatisfactory state of trade in the East-end of London, as reflected in the unprogressive revenue of the Company from the sale of gas to private consumers, and the loss inflicted on the Company by the mismanagement of the residuals trade by their big neighbour. Certainly, the accounts of the Commercial Company for the past half year are not particularly encouraging; but we must agree with Mr. George Livesey and Mr. H. E. Jones that, after all, matters are not really so very bad with the undertaking as the Chairman seemed to think. Indeed, the Company are pretty much in the same position in all essential respects as they have been any time these many years past. They have not had the advantage of an expanding district; but they have hitherto done very fairly well with their residuals. If the latter fail them, and it continues to be impossible to earn the increased dividends to which the proprietors have become accustomed of late, these must be reduced, which will not be a great hardship. Talk of reduced dividends is, of course, not pleasant. But there is nothing in the scheme of Providence or the nature of things to ensure the perpetual receipt of the present rates by the Commercial proprietors; and with coke and ammonia drugs in the respective markets, gas managers whose output does not grow cannot work miracles. To extend the popularity of gas stoves and engines is the chief resource of gas management confined within a ring fence; and this is not forgotten in the Commercial Road. The demand for coin-freed meters in the district is a growing one, it is true; and the point of saturation for these new conveniences of gas consumers is evidently far from being reached. At the same time, the fact of the total consumption of gas in the district having fallen off, while the number of coin-freed meters connected has considerably increased, points to the existence of a condition of things that deserves attentive consideration. It gives support to the argument of those who contend that new connections of this class do not always materially help the Gas Company, and that they are apt to take the place of ordinary meters—giving more trouble, returning less profit, and involving the expenditure of fresh capital that can sometimes be hardly spared for the purpose. The best check that can be put upon this—the factitious popularity of coin meters, as it may be called—is to make a sufficient surcharge for the gas measured by them as shall in any case recoup the providers for the additional outlay and trouble involved. It was satisfactory to learn that at length a move has been made by way of equipping the Commercial works with improved carbonizing and labour-saving plant and machinery.

The question of capital—to which we referred last week—was not thoroughly gone into; but something was said on the subject from both sides of the table. The matter is stated to be receiving the earnest consideration of the Board; and we can well believe it, seeing that the capital account is overdrawn, there is a heavy loan from the bankers, and fresh share capital can only be raised under conditions that are really antiquated, and it might be said obsolete, albeit undoubtedly legal. Mr. George Livesey wants the Board to take the step of advising the relinquishment of the legal right to issue fresh capital to the old shareholders at par; while there is the other side of the question expressed at the meeting by Mr. Ennis. It is a delicate position for the Directors; but we believe that it could be shown to be expedient, on all grounds, for the Company to follow Mr. Livesey's advice rather than that of Mr. Ennis. It is obvious that the legal right—or obligation, if the term is preferred—to issue new stock at par means the raising of capital at as high a rate as if the sliding-scale did not exist. Dear capital means unprofitable working; and what the existing proprietors have to ask themselves is: Which will be the more beneficial to themselves and to the undertaking—to pocket a premium on the new issues, few and far between as they are and must be, or to have their existing holding and the high dividend paid on it made more secure by being buttressed by fresh capital bearing as fair a return as actual conditions warrant? It is not our duty to go into the case fully for either view of the policy of the matter. But Mr. Ennis has committed himself to one side of it; and if he will be so good as to send us some proof of the advantages to be derived from adherence to his legal rights in the case (say) of a Commercial shareholder owning £100 of original and £100 of new stock, it would help to fix one's ideas, as the French say, on the subject.

The Affairs of the Dublin Gas Company.

THE half-yearly general meeting of the Alliance and Dublin Consumers' Gas Company was held on Wednesday, when the report and accounts summarized in last week's "JOURNAL" were adopted, and the usual dividends of 10½ and 7½ per cent. per annum were declared. The chief feature of the recent history of the undertaking is, of course, the parliamentary battle fought in the past sesson with the Dublin Corporation, which resulted in the ignominious discomfiture of the confiscatory plans of the Corporation. This victory, however, cost the Company £3364, which was more than enough to balance the revenue account. This expense was in addition to a charge of £452, incurred with reference to the previous abortive Bill of the Corporation. As the costs of the latter must be considerably more than these amounts, the ratepayers and gas consumers of Dublin ought to begin to learn by this time what they lose on one side or the other by the prevalence in the Municipal Council of that spirit of irreconcileable enmity to the Company which is as the breath of life to the small army of municipal law officials and hangers-on. It was made quite clear to the meeting that the Company are in no way to blame for this waste of money; and it appears, from what transpired at the special meeting of the Corporation reported in the "JOURNAL" for the 15th ult., that even the City Council are awakening to a sense of the perversity of their Gas Committee. The Corporation propose going to Parliament again next session; and it is not clear whether gas clauses are or are not to form part of the new measure. Mr. O'Meara is reported to have arraigned the Gas Committee in good set terms for their prejudice against the Company; charging them with not wishing to have the gas question settled. The Parliamentary Sub-Committee, he declared, had nothing at all to do with the origination of the futile gas clauses of the last Bill, and were not responsible for them. The Gas Committee, it appears, had their own way in the matter, and landed the Parliamentary Sub-Committee in so serious a defeat, that any repetition of such tactics would cost the rate-

payers dear; for the Company would have an indisputable claim for their expenses, if dragged to Westminster again on the same score. If Mr. O'Meara's advice were taken, and the present Gas Committee dissolved—leaving the gas question, such as it is, to be dealt with by the Committee of the Whole House—a long step would be made in the direction of settling these recurrent troubles. There are good and sensible men in the Dublin Corporation, and these must see the fatuity of the counsels that have hitherto swayed the Gas Committee. Whether they are strong enough to expel the evil from their midst, future proceedings in regard to the new Bill will show.

Meeting of the North of England Gas Managers' Association.

THE North of England Gas Managers met at South Shields on Saturday, to hear an Inaugural Address from their President, Mr. J. H. Penney, the Secretary of the South Shields Gas Company, and a paper by Mr. E. H. Millard, of Durham, on "Material and Tools for Main "and Service Laying." It is not often that a Gas Company's Secretary finds himself in Mr. Penney's position; and it is gratifying to be able to commend his address to our readers as a good specimen of the criticism of gas supply from the point of view which such an official might be supposed to naturally take. Not gas making, but dividend paying, is the chief care of "the office," as distinct from the works management. The latter, of course, finds the necessary money for the purpose; but in the Secretary's department the shareholder is more in evidence than he is in the executive officer's domain. The law of gas supply, and the public interest in its applications, are also matters that come under a secretary's immediate attention; and Mr. Penney discoursed about both in an unexceptionable style. He is, moreover, interested in gas-burners and electric lamps; and he had something sensible to say concerning the trade in gas-works residuals, and as to the value of gas stocks as investments. Mr. E. H. Millard's paper is intensely practical, and is in this respect one of the best productions of the kind that has seen the light in recent years. Such matter as he has put together —in a very pleasant form, be it noted—never grows old; and gas managers everywhere will feel indebted to him for the candid, workmanlike style in which he has treated a subject of the highest importance in the gas industry. Efficient gas main and service laying is the result of close attention to details grafted upon a few fundamental principles. The principles are in a large degree the same everywhere; but many of the details must be adjusted to circumstances. It is a little remarkable how a once favourite employment of engineers—the devising of new and improved forms of main jointing—has fallen into desuetude. The complementary observation to this is, of course, that the old-established yarn and lead joint is more firmly in favour than ever. Turned and bored joints have their advocates, principally for mains of large size regarded as superior to the risk of settlement; but there are no "fancy" joints in use at the present day. The error of coating pipes all over for gas distribution has long been understood. It was a practice borrowed from water-works engineers; but it has very little to recommend it for gas, as Mr. Millard remarks, while there is the disadvantage, which he did not mention, that sometimes the coating prevents the making of a tight joint. With regard to the placing of service-pipes in pitch troughs, which Mr. Millard stigmatizes as a fad, he may be assured that it is nothing of the kind, but an absolutely necessary precaution in most—probably in all—of the places where it is the practice. Some soils, as he must be aware, are rapidly destructive of wrought-iron pipe; and it is not easily practicable to follow his advice about exercising reasonable care in choosing the soil in which service-pipes are to be embedded. The paper is a thoroughly appropriate and useful one, taking it altogether; and it is only polite to assume that the quantity of unaccounted-for gas in the Durham district must be exceptionally small.

The London County Council and the Water Question.—A report from the Water Committee, which has stood over from June 9, comes before the County Council to-day, on reassembling after the recess. The Committee recommend that the Council should apply to Parliament in the ensuing session for power to bring additional supplies of water to London from the watersheds of the Usk and Llangorse. Notice has been given of an amendment by Mr. Westacott, that the recommendation be referred back to the Committee.

WATER AND SANITARY AFFAIRS.

THE report of the Directors of the East London Water Company, to be presented at the meeting of the proprietors on Thursday, is very brief, although it goes beyond the limits of the half year, by referring to the late interruption of the constant supply. That which may be thought wanting in the report is to be more than made up in a pamphlet which the Directors intend shortly to issue, giving quotations from the public press in reference to the supply as affected by the drought, together with extracts from parliamentary proceedings relative to the Company's Bills of 1893 and 1894. It is obvious that the full range of such facts could not be fully discussed within the usual compass of a half-yearly report. Neither does the subject altogether belong to the present statement. The Directors' report only extends to June 24, whereas the constant supply was maintained up to July 16—a period three weeks later. That the Directors and officers of the Company were previously subject to "great anxiety" owing to the persistent drought which had set in, is undoubtedly true; and the incident comes within the period to which the report more immediately refers.

In one respect the report is strictly limited to the half year ending at Midsummer, and that is in the matter of the accounts. A very disingenuous disregard of this circumstance has enabled at least one of our contemporaries to pen certain hostile criticisms on the Company and their Secretary. The "Daily Chronicle" has endeavoured to make it appear that Mr. Crookenden's statements as to the strain brought upon the Company by the drought are at variance with the fact shown in the report, that during the half year there has been an increase in the revenue and a decrease in the expenditure. The supposed contradiction is entirely the creation of the "Chronicle." How could the distress which followed July 16 make its mark in a balance-sheet ending on June 24? As reasonable beings, we must wait for the half-yearly report ending at Christmas in order to ascertain the financial result of the phenomenal drought which took effect after Midsummer Day. Pending the next report, the history of the interruption to the constant supply will appear in the forthcoming pamphlet, though, of course, nothing will convince the "Chronicle" as to the integrity of the East London Company.

We shall also look with interest to the speech from the chair, to be made at the meeting of the proprietors two days hence. "London" has been equally unscrupulous with the "Chronicle" in disregarding the limit of time. It has described the Company as paying a dividend of 7 per cent. It is 3½ per cent. for the half year. What it will be for the year remains to be seen. Concerning this dividend, "London" says: "We wonder the Directors dare take it." Of course, it is a dividend for the shareholders, and not merely for the Directors. But our veracious contemporary goes on to say: "The money has been obtained "from the poor people of the East-end mainly for water "which was never supplied." This is simply and absolutely untrue. The profits which furnish the dividend have accrued during a period in which the constant supply was in full force. The Company are said to have insulted the people of the East-end "by the grossest "misrepresentations and the meanest accusations." It is on the Company that this kind of wrong has been done; and the wrongdoer has been the "Chronicle." Insult and misrepresentation have been launched against the Directors; and there appears to be a fixed determination to go on piling up the abuse, without any concern as to the merits of the case. The *animus* is so extreme that any attempt to correct it seems hopeless.

Something like that which we foreshadowed last week is apparently coming to pass; the Vestries and District Boards having commenced to busy themselves with analyses of the water supply, under conditions likely to yield results more extraordinary than trustworthy. The Hackney Vestry have bottled off a sample of water from a cistern in Downs Road; and the Analyst says the water "is not satisfactory in its character"—at which we are not surprised. A sample taken from the main elsewhere is described as exhibiting some organic contamination

"of vegetable origin." This is understood to justify a statement made by the belligerent Mr. Kyffin, that the Company are delivering water "largely impregnated "with sewage." If Mr. Kyffin is responsible for such an inference, we need scarcely say that his chemistry is rather peculiar. Limehouse is said to be also "raising its "voice" against the impurity of the supply. At a recent meeting of the District Board, one of its members produced a bottle of water which had been "drawn direct "from a baker's tap." On the bottle being shaken, the contents immediately became "brown and muddy." The question is asked: "Can nothing be done to stay the "ravages of this Company?" One thing, indeed, suggests itself, and that is: Why continue to put any faith in Dr. Frankland, Mr. Crookes, Professor Dewar, or even in Major-General Scott, if all their analyses and examinations are to be ignored, and if reliance is to be placed on local analyses connected with bottles of water drawn from somebody's cistern or a baker's tap?

PERSONAL.

Mr. WILLIAM OWEN, late of Horley, has been appointed Manager of the Twyford and Wargrave Gas-Works, Twyford.

The labours of Mr. A. P. MAIN, of Messrs. R. and A. Main, in the direction of promoting the use of gas for cooking and heating purposes are well known to many of our readers. But they are probably not aware that he is equally earnest in philanthropic work. In an article on the first year's progress of the Robert Browning "Settlement," at Walworth, which appears in the current number of "London," the assistance rendered to the Warden (the Rev. F. H. Stead, M.A.) by Mr. Main receives appreciative acknowledgment. He is at the head of the Young People's Department, which he carries on with much enthusiasm. He has organized a boys' brigade, which has a roll of 70 members, a drum and fife band, a club for social recreation, and a summer encampment. A portrait of Mr. Main accompanies our contemporary's reference to this interesting and important department of the Settlement.

The Old Chelsea Water-Works.—In noticing in the "JOURNAL" last week the recent discovery in Piccadilly of some of the trunks of trees formerly used in supplying water in London, it was mentioned that they were doubtless part of the distributing system connected with the old Chelsea Water-Works. It appears that in the time of the Stuarts, there were in Hyde Park a number of pools—eleven or twelve—all communicating with each other, and fed by a small stream, called the West Bourne, which intersected the Park, and joined the Thames at Millbank and Chelsea. These pools and the stream were probably afterwards the source of the circular reservoir which is to be found in old maps of Hyde Park (about 1737), and which belonged to the above-named works. From it, along the pipes now brought up in Piccadilly, were supplied not only Kensington Palace and the "suburb" of Piccadilly, but also the new buildings about Oliver's Mount (now Mount Street) and the northern parts of Westminster. The machinery used for forcing the water was at that time so primitive that the water had to be conveyed to the houses on the high ground near Grosvenor Square by means of a mill turned by horses. The licences of the old Chelsea Water Company terminated towards the end of the reign of William IV., when the engine-house, which was opposite Grosvenor Gate, was taken down.

The Secret Commission System.—In connection with the comments on this subject which appeared in our editorial columns last week, it may be of interest to reproduce the following remarks of our outspoken contemporary the "Pall Mall Gazette" a few days since: "Commercial morality is a subject second to none in interest in an age which is nothing if not commercial. The ethics of trade commissions, which was brought prominently before the High Court of Justice not long ago, have been discussed by correspondents in the columns of 'The Times,' which sums up the *pros* and *cons* sensibly enough this morning. There are, as they say in France, 'faggots and faggots,' and, similarly, there are commissions and commissions. There is the commission which is given and received openly and honestly; and there is the commission which is the outcome of a secret, and, by implication, dishonest transaction. Between the moral light of the one and the moral darkness of the other there is a penumbra of more or less doubtful cases, in which the commercial conscience may easily play at casuistry. Casuistry, however, in the sense in which it is likely to be applied to such transactions, is but a sorry substitute for straightforward honesty and ethical common sense. 'Should I like all parties affected by my action to know what I am about?'—such is the question which, if honestly put and honestly answered, should suffice to enlighten any man as to whether he is doing right or wrong. The contemporary commercial conscience is, however, somewhat too apt to regard that interrogatory as bald and brutal."

ESSAYS, COMMENTARIES, AND REVIEWS.

GAS AND WATER COMPANIES IN THE STOCK MARKET.

(For Stock and Share List, see p. 657.)

THE week just closed brought about a better state of things on the Stock Exchange; but the improvement was not effected all at once. There was a considerable tendency from day to day to fluctuate, according as the better or the worse influence chanced to prevail. At one time a bright and confident tone would carry prices up gaily; and at another, a feeling of uneasiness would undo some of the recovery. The settlement had a good deal to do with this; but it went through better than had been expected. The improved political prospect, too, was a powerful factor for good. So that, on the whole, the gains have been largely in excess of the losses; and prices have advanced accordingly. The Money Market is in a much easier condition; and no sort of apprehension of any pinch is felt. Business in the Gas Market has been brisk and active. The general tendency was cheerful; and prices rose with some buoyancy. In Gaslights, the better tendency which was just perceptible at the close of the preceding week soon asserted itself; and from 306 on the opening day, a smart rise took place, with good active business. The closing mark on Saturday was 310—the best price attained in the week. There was also a resumption of activity in the secured issues, which had been quiescent for some time; and a large number of transactions were recorded at good middle figures. South Metropolitan opened well, and showed at once that it meant to go better. On Thursday, the quotation rose a couple of points; and the closing price was the best of the week. Commercials were quiet and unchanged. At the meeting on Thursday, the Chairman, who is always careful not to paint things in too bright colours, sought to check any possible passion on the part of the shareholders for bloated dividends, which involve serious encroachment on the reserves. Here he is quite right, though some may have thought he depicted things rather too darkly. But most will agree there are few Companies stronger than the Commercial; and if they can only see their way to raising capital cheaply, they will be stronger still. The Suburban and Provincial undertakings were quite stagnant—not one of them making the slightest sign. The upward movement was shared by the Continental group to a certain extent; and Imperial advanced a point, although prices did not seem very buoyant. Among the rest, one or two were fractionally better on *ex div.* quotation. In Water Stock, the quotations of several debenture issues were lowered; but there was no business done in anything—in fact, a quieter week never was known.

The daily operations were: Gas opened unchanged on Monday, and was quiet and steady all day. Cape Town rose ½. Tuesday also was inactive; and the only move was a rise of 1 in Imperial Continental. Wednesday was busier, with much activity in Gaslight "A;" the quotation advancing 2. Lambeth Water was 2 lower. Thursday's transactions were all in Gaslight (the "A" gaining 1 more) and in South Metropolitan, which rose 2. In Water debenture issues, Chelsea fel ¼, and East London and New River, 2 each; but Southwark was 1 higher. General activity was fairly well maintained on Friday, without any further change. Saturday was quiet and steady; and quotations again closed without further variation.

ELECTRIC LIGHTING MEMORANDA.

The Disaster of the Brush Company—The Prospects of Electric Traction—A Movement in Electric Omnibuses.

THE gloomy forecast we have repeatedly made in this column respecting the fate of the big electrical engineering concerns of the United Kingdom is justified already in regard to the Brush Company, whose report on the trading for the year ended June 30 was summarized in our "Electric Lighting Notes" last week. The Directors find themselves in the unhappy position of having to lay before the shareholders accounts showing a net profit for the year of £4615; and even this is subject to the realization of the whole of the suspense account, many of the assets included in which are considered doubtful by the Directors. These consist largely of shares and debentures in other Companies; and the Auditors declare that they have no means of ascertaining their value. In view of this state of affairs, the Directors recommend the shareholders to write off £1 per share from the ordinary shares of the Company, which stand at £3 each; and by means of this sacrifice, which will produce a figure of £90,000, it is proposed during the current year to reduce the item of patents and goodwill, and to eliminate from the books such of the items included in the suspense account appearing in the balance-sheet as may prove to be valueless. Yet it is this very same suspense account which is relied upon at present for showing the meagre balance to the good which the Directors offer as a sop to the proprietors. Not to put too fine a point upon it, the real facts of the situation spell something that sounds more like bankruptcy than any more cheerful word. The measures already taken and in contemplation by the Board for dealing with so much of the

affairs of the business as lies within their control, tell much the same story. General and administrative charges have been cut down by nearly £4000; and further economies are to follow. The Vienna factory, once expected to do great things, has been sold off; and the opportunity has been taken for sub-dividing the capital charge for property, patents, and goodwill, which has hitherto appeared under one heading in the balance-sheets of the Company. The result is a revelation. Of all the capital burden, only £88,847 is represented by works and plant; leaving £206,397 to represent patents and goodwill. The Directors state that while many valuable patents owned by the Company are included in the former item, the early patents in connection with electric lighting, for which large sums were originally paid by the Company, have now mostly expired. It may be doubtful how much ought still to stand in the Company's books under the two heads of "Patents" and "Goodwill;" but it is pretty clear that the amount of the reduction of the ordinary shares recommended by the Board will prove quite inadequate to meet the emergency. If one-third instead of two-thirds of the nominal value of the ordinary shares should remain after a really sufficient cut has been made into this class of capital, the holders might be thankful.

Naturally, the Directors profess to be confident that the concern will recover itself. They attribute their losses to the general falling off in the volume of central station electricity supply contracts, and to the underselling that prevails in the electrical machinery market. As a contemporary truly observes, this falling off in contracts for central stations must come with the cessation of requirements in this regard of most of the principal towns in this country. And the Company presumably do not wish or hope for any repetition of their experiences with the City of London Company, which turned out a thankless child capable of biting with more than the sharpness of the serpent's tooth. The Directors anticipate that the future demand for electric traction plant will fully compensate for the shrinking of orders for electric lighting machinery. Perhaps so. But it is a forlorn hope at best; and there is no probability that any reasonable sportsman would bet upon the bulk of any new development of electrical engineering along this line falling under the domination of the Brush Company. They were started to boom electric lighting; and they did it for all the opening was worth. Now the Brush tradition is dying: and the best the present administrators can hope for is that it may die decently. There are plenty of young and energetic rivals in the field, with none of the obligations of the old dynasty to bear; and these will starve out "Grandfather Brush" in his decrepit old age.

In connection with the question of electrical haulage, referred to in the Brush report, it should be noted that the first ordinary general meeting of the London Electric Omnibus Company, of which Major S. Flood Page is Chairman, has been held. The Chairman presided, and delivered a long and ingeniously-prepared speech setting forth the character and prospects of the enterprise in which the Company was formed to engage. This is nothing less than the exploitation, as a "pioneer company," of the horseless carriage idea—"movement," the Chairman termed it, with unconscious irony, seeing that, as a matter of fact, there is no electric omnibus at present extant that moves of itself. The truth of the matter is that an Act of Parliament has been passed relaxing some of the restrictions that have been accused of hindering the development of mechanical road carriages; and the Company now under notice has been floated with the intention of getting hold of any trade of this kind that may crop up. The Chairman said "they had an omnibus almost ready." This omnibus has been "almost ready," to our certain knowledge, for something like fifteen years. It is about this time since secondary electric batteries were put into road vehicles; and they have all been taken out again times without number, in order to make just that little adjustment which would enable the arrangement to work without the ignominious attendance of horses to drag it back to the stable-yard. Of course, Major Flood Page declares that, when his new omnibus appears, it will be the best, the easiest, and the most comfortable that has ever been introduced. On the other hand, the electrical adviser of the Company—Mr. C. E. Spagnoletti—told the meeting that "with regard to the accumulators, they were free to adopt the best they could get; and there was no reason why, under these circumstances, they should not be able to obtain the best in the market." Certainly; but supposing there is nothing in the market suitable for the purpose (which is positively the case), what prospect has the Company of getting such a prime necessary evolved? Why should this speculation be able to secure a better accumulator system than the Brussels, Birmingham, and Barking tramway authorities could obtain for their own easier service? The "true inwardness" of Major Flood Page's position in this connection peeps out in his announcement that "they had already had applications from provincial towns asking for permission to form companies." It is pretty safe to predict that for every electric omnibus that is put upon the streets of London and made to jog along downhill somehow, attempts will be made to run ten concessionary companies. The latter may be easier to start than the former; but they will all exhibit great facility in coming to a dead stop.

THE GAS INDUSTRY ON THE PACIFIC COAST.

The meeting of the Pacific Coast Gas Association (an abstract report of which has lately been completed in our columns) suggests several interesting reflections. For one thing, our Californian friends can claim that their proceedings are enlivened by a much larger diversity of experience than any similar Association. There have been complaints as to the difficulty of carrying on Association work in the more sparsely populated districts of England; but here we have an Association claiming about one-fifth of the entire territory of the United States, with a coast-line over 1000 miles long, and extending inland some 700 miles. A glance at the map shows that this extensive area was tolerably well represented at the meeting, as references were made in the course of the discussions to experiences at Tacoma in the extreme north, and also at Los Angeles and San Diego in the south. The attendance was not confined to a comparatively small area, of which the place of meeting formed the centre. The President mentioned, in the course of his address, that their large district could only boast 66 gas undertakings, of which 42 are already represented on this young Association. Evidently the wide area—which is a disadvantage in the case of undertakings under statutory protection, and with no immediate fear of competition or anything else likely to interfere with the maximum dividends before their eyes—tells in a different direction on the Pacific Coast. The members occupy isolated positions, are thrown on their own resources, and also have greater responsibilities resting upon them than obtain in England or Europe. Not only is the Association meeting the event of the year, but the programme is of more vital importance to them than is the case under more prosaic surroundings. It not only possesses more novelty and variety, but it affords the opportunity for acquiring information, and for good fellowship, that does not obtain in any other way throughout the year. There is therefore much more inducement to the Californian gas engineer to attend his Association meeting than there is to his English *confrère*, who has the pick of perhaps half a dozen similar gatherings, and not uncommonly fails to put in an appearance at any. Consequently we find that the Pacific Coast Association can evolve a programme containing more real intrinsic value, in the way of papers and also of discussions, than many Associations boasting a much greater number of members; and we have an interesting proof of the fact that the success of an Association is more dependent upon the interest and support extended to it by individual members, than upon numbers or favourable circumstances in the matter of situation, &c.

As to the variety of experiences, it appears that gas-making materials from all parts of the world find their way to California. At some Associations it would only be possible to quote practical results with coals from one or two districts; but gentlemen present at this meeting could speak of practical working, not only with local coals, shales, and fluid hydrocarbons, but of coals from Japan, the various coals and shales of Australia, Welsh anthracite, and petroleum from Peru. We often talk of the old lady who experienced spiritual ecstacies over "that blessed word Mesopotamia;" and it is amusing to notice that the word "Wallsend," which has for so many years been one to conjure with in the English house-coal trade, has been adopted for a similar purpose in Australia, and as such has found its way into California. The generating apparatus used seems to follow the main types of Lowe apparatus for water gas and the ordinary retort for coal gas. These have to be rigged occasionally, in a rough-and-ready manner, to suit the material to be worked; the wide choice of materials being further complicated by the fact that prices of freightage are continually fluctuating, and the coal that is cheap to-day may be at an almost prohibitive price to-morrow. It is no use to fix upon one brand which appears, on the whole, to be best suited to the local circumstances; but the gas engineer must be ever on the alert, watching coal markets and rates of freightage, and buying cheap lots without being too nice over the quality. Under these circumstances, no Californian gas manager can forecast the nature of the material he will be using two years hence.

We might almost go so far as to add that the Californian gas manager scarcely knows whether his company will be in existence in two years' time; for it transpired that in this part of the world the gas company depend, not only for their prosperity, but also for a remunerative business of any kind, upon being able to preserve a good understanding with the local authorities. They labour under many legislative restrictions which, if considered necessary in the interests of consumers, are of no benefit in that respect. They offer no inducement to sell cheap gas, but secure, so far as it is possible for law to do so, that it should be sold at the highest possible price that the local authorities can be induced or cajolled to accept. The strong language used in the paper on "Municipal Ownership," and the sympathetic reception of the same by the meeting, bore eloquent witness to the existence of wrongs which must perforce be endured because there is no remedy, and to the helpless condition of private enterprise. As usual under such circumstances, the question of how to conciliate the municipal authorities overshadowed any consideration as to the benefit of the consumer; and some speakers appeared to favour the Paris plan of subsidizing the Municipality, by which both Company

and authority get a large profit—which the consumer, of course, has to pay. It is to be hoped that a plan in which the interests of consumers are fairly considered will eventually gain the day; for the Paris system would never answer amidst the numerous resources of such a place as California, which, if possible, render the question of cheap gas more important than in less favoured localities.

The papers on consolidated gas and electric light plants and on the working of water-gas apparatus, incidentally showed that it is possible to overload the technical staff of the undertaking with operations involving elaborate details, with the result similar to everyday experience in trade. The man who undertakes too much—either in the way of extending the ground covered by his business, or in trying to work a number of branches—does not at the best secure profits that are proportioned to the risk and extra labour; and frequently he finds that one or more of the new departures is in itself a source of loss, and is conducted to some extent at the expense of the old-established part of the business. Under the peculiar conditions of joint-stock enterprise existing in California, there is a great deal in the plea that it is well to cover as much ground as possible, even if some loss is the result, in order to keep out speculators who aim not so much at establishing a steady legitimate trade as at being bought up, either by the existing companies or by the municipal authorities. It is better to conduct business for a time at a loss which is only known to those concerned, than to embark upon a war of rates that will do nothing towards consolidating or securing the existing business. But gas companies who are working under statutory enactments, will do well to carefully consider the experiences on the Pacific Coast before embarking in electricity or water gas. Especially is this word of warning necessary to small concerns, which cannot afford to undertake enterprises involving an expenditure equivalent to 10 per cent. or so of their total capital, unless fairly well certain as to the results. There is a great deal in the observation that meters are a necessity to a paying business—whether in gas or in electricity. The suggestion for a spirited policy in the matter of introducing gas-stoves was received with favour; and in this respect, there is a remarkable agreement with the policy of the London Gas Companies, who do not stop at an outlay of £4 or £5 per consumer to secure new business. In California, where gas is generally sold at 7s. to 10s. per 1000 cubic feet, there is more margin for enterprise in this direction than in districts where it is supplied at about a quarter the price. An additional 10,000 cubic feet per annum means £4 or £5 added to revenue in the first case, and only £1 or £1 5s. in the second.

The Association enjoyed the advantage of having a President who, notwithstanding the drawback of locality, appeared to be thoroughly in touch with all modern improvements in every branch of his profession. His plea for uniformity is one that has made itself evident in many times and places. The form of accounts scheduled in the Gas-Works Clauses Act, 1871, has served as a model in England for uniformity in getting at the cost of gas; and as regards carbonizing results, a fairly uniform method applicable to coal has gradually been evolved. The introduction of fluids that are bought by the gallon, and are of varying specific gravities, has somewhat interfered with it; and where liquids and solids are indiscriminately used, the only hope of uniformity in working results is to fix upon some standard of weight to which all must be adapted. In California, where fluids appear to be used to a greater extent than in England, the need for such an adjustment is more marked. Not the least important of the contributions from the President was his design for a hot scrubber, which carries out the idea, already popular in England, of allowing the condensed products to return to a point near the inlet.

In concluding, we congratulate the Pacific Coast Association on the success which has attended their fourth annual meeting. The President remarked that they were all active members, which is true in a double sense. The various special arrangements referred to—such as wrapping sawdust saturated with petroleum into convenient sized packets with old sacking, or telescoping a gasholder while keeping it in working order all the time—indicate that rough and ready ingenuity which is only developed by foreign service, where the engineer is entirely dependent on his own resources for months at a time, without any prospect of help from the contracting engineer or manufacturer of gas apparatus. It is evident that the gas engineer who does not see the good of Associations, and thinks that everything relating to gas is already sufficiently thrashed out, would cut a sorry figure on the Pacific Coast, where he would be required to know all about everything from the retort to the burner, and to adapt his resources to the material that was cheapest at the moment, while conducting, at the same time, negotiations with the local authorities, and being continually on his guard against competition that might at any time assume ruinous proportions.

The Welsbach Patents in Italy.—We are informed that official notification has been received from the Welsbach Incandescent Gas-Light Company in Italy that, by a judgment given on the 26th ult., the representative of the Meteor Company at Padua was sentenced to pay a fine of 150 frs. for infringement of the Welsbach patents; and, further, to pay the costs of the action, and 1340 frs. damages.

GAS ACTS FOR THE SESSION 1896.

(*Concluded from p.* 588.)

The Barry Urban District Council Act contains a part relating to gas. In this the limits within which the District Council may supply gas are extended so as to include the whole of the parish of St. Andrew's Major. Local authorities interested are empowered to purchase their portion of the undertaking.

The Bilston Improvement Act contains a part which deals with gas. The limits of supply are defined as being the district of Bilston and the Coseley district. It is made lawful for the Council, subject to the approval of the Local Government Board, to purchase from the Bilston Gaslight and Coke Company, and for the Company to sell to the Council, all their machinery and plant, and the pipes and mains and other property belonging to them, and to enter into any contracts or agreements for this purpose. It is lawful for the Council to purchase the property at a price to be ascertained by arbitration under the Lands Clauses Act, but not for the Council, without the consent of the Company, to commence any work, or to enter into any agreement for supplying gas, unless they have previously bought out the Company. At any time after the purchase by the Council of the works and property of the Company, interested local authorities may purchase their own portion of the undertaking. The maximum price for 15-candle gas is 5s. per 1000 cubic feet, tested at the works. The acccounts of the gas undertaking are to be kept separate; and the surplus profits, after the usual applications, and the provision of a reserve fund, if the Council think fit, are to be carried to the district fund. It is provided that, before the Council alter the situation of any gas-pipes not belonging to them laid in any street, they shall require the owner to make the alteration, in such manner and within such reasonable time as shall be specified in the notice, the expenses to be paid out of the general district rate. If the notice is not complied with, the Council may then proceed to effect the alterations required; provided that nothing shall be done to permanently injure any gas-pipes, or prevent the gas flowing as usual, without the consent of the owners. The phraseology of some portions of the Act differs from the stereotyped form, which may be due to the fact that, under the Bilston Improvement Act, 1850, the Bilston Township Commissioners, who are now the Bilston Urban District Council, were established for the better supply of the township wih gas, and were accordingly authorized to construct gas-works, but did not exercise the power.

The Burton-upon-Trent Corporation Act contains, among various miscellaneous provisions, permission for the Corporation to supply and deal in gas-fittings within their limits of gas supply, and enables them to recover charges therefor. Section 22 ("Power to Remove Meters and Fittings") of the Gas-Works Clauses Act, 1871, is made to apply in the same sense to electric light fittings supplied by the Corporation.

The Edinburgh Extension Act amalgamates the Burgh of Portobello with the City and Royal Burgh of Edinburgh, in consequence of the community of interests existing between the two places, and their proximity. The new and enlarged boundary is defined. The obligations imposed on the Corporation within the existing burgh under the Act with respect to lighting, will not extend or apply to the lands or part of the larger area scheduled in the Act, until such areas shall be sufficiently covered with buildings to render it expedient, in the judgment of the Local Government Board of Scotland. The yearly value of all underground gas-pipes and accessories for the purpose of the burgh assessments is to be held to be the nearest aggregate sum of pounds sterling to one-fourth of the yearly value thereof. An agreement between the Corporation and the Portobello Gaslight Company, Limited, for the sale of the undertaking of the Company to the Corporation, is confirmed. Under this agreement, the price paid for the property is the sum of £2500, besides annuities to the amount of £1200 per annum, and the value of all stocks and stores, inclusive of such gas as might be in the holders and pipes at the date of the transfer, which is fixed for Nov. 11 next. It is provided separately that the Corporation should not supply gas from the works acquired by the agreement in competition with the Edinburgh and Leith Corporations Gas Commissioners in any district in which the Commissioners now supply gas.

The Leamington Corporation Act contains a part relating to gas, by which it is enacted that at any time within three years the Corporation may require the Leamington Priors Gas Company to sell their undertaking to them for such consideration (being a sum in gross, and not by way of annuity), and on such terms as may be agreed upon, or settled by arbitration under the Lands Clauses Acts. The powers of the Corporation under this part of the Act are subject to the following conditions: The authorized reserve fund, or such part thereof as the Company shall desire to be withdrawn from the purchase, is to remain the property of the Company, to be available for compensating such of the Directors, officers, and servants of the Company as the shareholders shall by resolution determine. But, in valuing the undertaking, any such amount is to be considered by the arbitrators. The purchase-money is to include a reasonable sum to cover the cost of winding up the Company. The purchase-money, or any part thereof, may, if so agreed, be in the form of securities issued by the Corporation. The Corpo-

ration are to afford free access by the officers of the Company to any books or papers handed over on completion of the transfer, for any purpose connected with the winding up of the Company's affairs. The general law of gas supply is to apply to the Corporation from and after the transfer; the prescribed pressure of gas being 6-10ths and 8-10ths for night and day respectively, and the illuminating power 16 candles when tested on the works. The surplus profit on the undertaking is to be carried to the district fund account. Other local authorities interested may purchase their portions of the undertaking at any time after the transfer. The Corporation are authorized to borrow the money required for the purchase of the gas undertaking, together with the amount of any mortgage debt of the Company taken over by them, to be paid off in forty years.

The Matlock Bath Gas Act authorizes the Matlock Bath and Scarthin Nick Urban District Council to acquire the undertaking of the Matlock Bath Gaslight and Coke Company, Limited, which was formed in 1853. It is recited in the preamble that the share capital of the Company recently consisted of £4500, fully paid up; but in 1895 the capital was increased to £15,000, and the capital holding of each shareholder was doubled, without any further payment being made or obligation incurred by such shareholder. The sum of £10,000 is also stated to be required for extending and improving the gas-works. The Act provides for the sale of the undertaking upon terms to be settled by agreement, or by arbitration in accordonce with provisions of the Arbitration Act, 1889. In addition to the value of the undertaking so ascertained, the Council are to pay £250 as winding-up costs. The Council are also to pay to any officer, other than a Director, and servant, other than a weekly one, in the employment of the Company, who has been in such employment for a period of eight years and upwards, and who shall not be willing to continue, or shall not be continued, in the service of the Council, an amount equal to two years' salary. The gas limits are defined; and it is not lawful for the Council to supply gas within the present limits of supply of the Matlock and District Gas Company, Limited, unless with the written consent of the Company. For the protection of the Matlock District Council, it is provided that, so long as the Council shall supply gas within the district, 24 hours' notice is to be given of their intention to break up the roads or streets, stating the probable time for completing the operation; the Matlock Surveyor being required to do the work of filling in and reinstating at the Council's expense. Within seven years from the date of transfer, the existing gas-works are to be removed, and re-erected at some place outside the Matlock district. Certain lands for gas purposes are to be compulsorily acquired within three years. In default of proper notice of removal, consumers are liable to pay for gas registered up to next usual period for indexing the meter. The maximum price of gas is 4s. per 1000 cubic feet; and the Council are forbidden to charge a higher differential rate to outlying consumers. The illuminating power of the gas is to be 18 candles, tested on the works by means of the No. 1 "London" argand burner, or, in certain circumstances, "any other burner or chimney approved for this purpose by the Board of Trade." Interest at the rate of 4 per cent. is to be paid on consumers' deposits. Other local authorities interested may purchase their portions of the undertaking at any time. The gas loan is to be paid off in fifty years, and the costs of the Act in ten years. The amount of the authorized reserve fund is £500; and before carrying the surplus profits of the undertaking to the district fund, these are to be applied in improving and extending the undertaking.

The Redheugh Bridge Act authorizes the reconstruction of the bridge named, which crosses the River Tyne, and joins the city of Newcastle-upon-Tyne and the borough of Gateshead. For the protection of the Gas Company, it is provided that the existing gas-main on the old bridge shall be preserved until the mains on the new bridge and approaches are completed. Two new 27-inch steel welded gas-mains are to be made and laid, and connected with the Company's mains, by and at the expense of the Bridge authorities; but when the work is done, the Company are to pay £3500 towards the cost of it. They are entitled to an easement and such rights on the new bridge and its approaches as shall be necessary to enable them to make proper use of the new gas-main. The Company are further empowered to subscribe £5000 towards the capital cost of the new bridge.

The Rotherham Corporation Act enables the Corporation to acquire additional gas lands, deal in gas fittings, supply gas for heating purposes and motive power, and stop up a roadway at present dividing the gas-works. Notwithstanding anything contained in sections 35 and 36 of their Act of 1870, the prescribed burner for testing the quality of the gas manufactured by the Corporation is to be a "London" argand No. 1, or any other burner or chimney approved for this purpose by the Board of Trade. The Corporation are authorized to borrow a sum of £20,000 for gas-works purposes; and this is to be paid off in forty years.

The Ystradyfodwg Urban District Council (Gas and Water) Act empowers the District Council to purchase the undertaking of the Ystrad Gas and Water Company on terms to be agreed upon or ascertained by arbitration under the Lands Clauses Acts, subject to the provision that the price is to be payable as a gross sum, and to be apportioned between the gas and water undertakings according to their respective values. The provisions of the gas part of the Act are not to take effect until after the transfer. The limits of supply are defined; and power is given for the purchase of 5 acres of additional gas lands by agreement. The gas capital is to be paid off in forty-five years. The surplus gas revenue is to be applied in improving and extending the gas undertaking, before being devoted in equal moieties to reducing the price of gas and to the district fund.

NOTES.

The Siemens Fire.

It is a source of satisfaction to find someone ready to speak well of a once-famous device which has for some years been so far in the background as to have escaped public notice. Hence we gladly note that Mr. P. W. Clayden has written to "Nature" to say that he has had a Siemens gas and coke fire in his study for fifteen years. There was much trouble, we are told, but without mention of details, in getting it put in properly; and Sir W. Siemens himself was kind enough to advise Mr. Clayden about it. Success, however, once attained has been permanent. The arrangement is described as burning very little gas; and the coke is cheap. The gas is only used to kindle or liven up the coke. "Everybody admires the beautiful fire it makes; and there is no smell and no smoke." The coke requires to be broken to the size of a small apple—that is to say, the ordinary "broken coke" of the gas-works; and the bottom of the fire must be kept clear, which Mr. Clayden effects by the use of an iron shovel. It is the neglect of this essential process, he thinks, which makes the Siemens fire sometimes a failure. His he claims to be in all respects "a brilliant success." The user in question dates from the Smoke Abatement Exhibition of 1881. It is perhaps worth gas officials' while to look again into this matter. The Siemens fire may have fallen into disrepute from several reasons; but at least one serious thing against its chances of being kept before the public is the circumstance of its not being a patented or a proprietary article. Consequently, it has been nobody's business to push it. Gas companies, however, might try exhibiting the arrangement in their show-rooms—instructing their fitters how to make them for consumers' grates—because where they succeed they help to get rid of both gas and coke.

The Loss of Head Due to Elbows in Pipes.

In a series of articles describing the Engineering Department of the Yorkshire College, Leeds, "Engineering" has given some particulars of the results of experiments conducted in this institution to ascertain the effect of the friction of water in a pipe fitted with sockets, elbows, tees, bends, and a sudden enlargement. The experimental pipe was ½ inch diameter; and the friction was measured by loss of head in the usual way. It is shown in works on hydraulics that the loss of head due to resistances of this nature to the free flow of water in a pipe may be expressed in terms of a length of plain pipe that will give the same loss of head due to friction. Experiments extending over several years show that the loss of head resulting from a socket is equal to that due to from 15 to 17 diameters of the plain pipe; while that of easy right-angled bends may be from 10 to 15 diameters; and that due to sharp, right-angled elbows from 30 to 36 diameters. At one place, the experimental pipe is suddenly enlarged to five times the regular diameter. The total loss due to this and the contraction should, by calculation, be equivalent to the friction of 1·92 feet of this ½-inch pipe. Experimentally, however, the loss is only equivalent to the friction of a length of from 1·2 to 1·4 feet. The experiments show the detrimental effect of sharp elbows on the discharging capacity of a pipe system.

The Effect of Fire Heat upon Cement Concrete.

Some tests of portland cement exposed to the heat of a gas assay furnace have been made by Mr. J. S. Dobie, with the object of ascertaining what would be the effect of a fire upon a structure into the construction of which this material entered largely. The cements used for the purpose were first thoroughly tested for fineness, strength, and "blowing," and were found to be of the best quality. Tests were made upon neat briquettes, and also upon mixed briquettes of different composition, down to 1 part of cement to 3 parts of sand. The age of the samples varied from two months to about four years. On heating the briquettes, and removing them from the furnace, the first change noticed was loss of weight; while almost all those of neat cement were more or less cracked. This loss of weight is due to the fact that hardened cement is a compound of hydrated crystals of aluminium silicate and calcium silicate; and heat drives off the water of crystallization, so that the loss corresponds to the quantity of water of crystallization driven off by the heat. Now, since the crystals depend upon the water for their formation, it is evident that when the water is removed the crystals must be destroyed and the cement ruined. Such was found to be the case in every instance. Briquettes which had lost by heating 19 to 20 per cent. of their original weight—which practically represents the weight of water that would be required for crystallization—were unable to resist any load whatever, and in few cases possessed 10 per cent. of their original strength. The effect of different degrees of temperature was not the same. Sudden exposure to great heat was

most destructive to the cement. An attempt was made to discover a critical temperature to which the cement might be subjected without danger of injury to the crystals, and where the cement would retain its cohesive powers. It was, however, found that, if such a temperature existed, it was below the lowest temperature generated by the furnace, which was considerably lower than red heat. The lowest temperature tried had the same effect as the highest—excepting, of course, that the lower the temperature the longer the time required to effect the loss of weight. All sand briquettes, whether cracked in the furnace or not, entirely disintegrated on standing in air for a time; the cementing material having been entirely destroyed. When heated and afterwards plunged into water, all briquettes became heaps of mud. The application of these data to concrete used in buildings exposed to risk of fire, is obvious. The author concludes that flues should never be constructed of concrete slabs or arches without an embedded iron skeleton. The great advantages possessed by cement or concrete as a fire-resisting material are its low conducting power and small expansion. The disadvantages are that it loses strength under heat, is ruined if water is thrown upon it while hot, and will disintegrate after a fire, if not while the fire is going on.

Economical Steaming.

Mr. Bryan Donkin has published an abstract of some experiments that have been carried on during the last few years by Professor Dwelshauvers-Dery upon a single-cylinder horizontal surface-condensing steam-engine, which possesses facilities for the introduction of steam, superheated or saturated, into three jackets, barrel, or covers. In the course of these experiments, very exact re-determinations of the mechanical equivalent of heat were made by observing the rise in temperature of a known quantity of water used for cooling the hollow brake. This brake absorbed a certain quantity of power; and so much heat was put into the pulley, which was continually taken away by a constant flow of water. The mechanical equivalent of heat, as found by Rowland, is now generally admitted to be 778 foot-pounds per Fahrenheit unit. The equivalent of this in metric measurement is 426·83 kilogramme-metres per calorie. The mean of six brake experiments made by Professor Dwelshauvers-Dery works out at 427·22 kilogramme-metres per calorie, or higher than the accepted figure by 0·1 per cent.—a very satisfactory result. The mechanical efficiency of the steam-engine in these experiments was 88 per cent., or, in other words, 12 per cent. of the total indicated horse power was absorbed by the working of all the parts of the engine itself. To determine the consumption of steam in pounds of water per indicated horse power, this procedure was followed: The number of thermal units actually used by the engine per indicated horse power per hour was ascertained. Then taking the number of thermal units per pound of steam as 1179, the weight of water consumed was given. Mr. Bryan Donkin pronounces this to be the right method, when the object is to compare the steam consumption of different engines, and particularly when some engines use superheated and some saturated steam; or if they work with different steam pressures. The Professor's best result was with superheated steam of 72° Fahr. of superheat, both in the cylinder and the jackets, and not draining the hot water from the steam-chest. This returned a steam consumption of 19·45 lbs. per indicated horse power per hour. The least economical was with saturated steam without jackets and without drainage, when the engine used 32·6 lbs. of steam per indicated horse power per hour.

The Winter Instructions of the Metropolitan Gas Referees, which were issued last Thursday, contain the usual intimation that, until further notice, the maximum quantity of sulphur permissible in London gas is 22 grains per 100 cubic feet.

The Driffield Gas-Works Purchase Question.—Mr. Thomas Newbigging, of Manchester, and Mr. Charles Sellers, of York, the Valuers appointed to fix the sum to be paid by the Driffield District Council for the purchase of the works, &c., of the local Gas Company, have sent in their award. The price is put at £22,500. The paid-up capital of the Company is £9900; and last year a dividend of 10 per cent. was declared. Considerable surprise was expressed in the town when the award became known last Friday; the amount being much higher than had been expected. Mr. Cripps, Q.C., was appointed Umpire in the event of the Valuers not being able to agree.

American Gaslight Association.—The annual meeting of this Association is announced to take place in St. Louis (Mo.) on the 27th, 28th, and 29th inst.—a week later than usual, owing to the holding of the meetings of two large Associations in the city in the second week of the month. The President for the year is Mr. C. J. Russell Humphreys, of Lawrence (Mass.). According to the official notice by the Secretary (Mr. A. B. Slater, jun.) in the "American Gaslight Journal," the technical portion of the proceedings will comprise papers on the following subjects: "Methods Employed in Introducing Gas-Stoves," by Mr. C. H. Nettleton, of Derby (Conn.); "Some Experiments on Internal Illumination," by Mr. Carter H. Page, jun., of Philadelphia; "Inclined Retorts Up to Date," by Mr. F. Egner, of Norfolk (Va.); "A Modern Retort-House," by Mr. W. A. Miller, of Cincinnati; "Separation of Water-Gas Tar," by Mr. A. S. Miller, of Long Island City. In addition, several topics will be brought on for discussion by short written introductions.

TECHNICAL RECORD.

NORTH OF ENGLAND GAS MANAGERS' ASSOCIATION.

Half-Yearly Meeting at South Shields.

The North of England Gas Managers' Association held their thirty-ninth half-yearly meeting at South Shields last Saturday Most of the company travelled by rail from Newcastle, in the forenoon, and the general rendezvous was at the railway bridge in King Street, South Shields, where tramcars were in readiness to convey the visitors to the Marine Park, at the end of Ocean Road. The President—Mr. J. H. Penney, the Secretary of the South Shields Gas Company—led the party through the park, which, though bearing traces of the advance of autumn, showed that, at the height of the season, it must have been a very fine ornament and attraction to the town. Near the park the visitors were interested in the exhibit, under cover, of the first lifeboat, which was built at Shields; and in a monument to the originator of the lifeboat movement, a Mr. Wouldhave, which has been erected near the beach. The party were then shown the Volunteer Life Brigade Station, at the end of the pier, and were afterwards carried, in special conveyances lent by the River Tyne Commissioners, to the seaward end of the south pier—a structure which stretches into the water for a little over a mile. The pier, along with the corresponding one on the north side of the channel, took about thirty-five years to build. The lighthouses at the ends of the piers are lighted by gas—the south one with gas supplied by the South Shields Gas Company, and the north one with gas supplied by the Tynemouth Gas Company. On returning to the town, light refreshments were served in the office of the South Shields Gas Company in Chapter Row.

The meeting was held in the Board Room of the Gas Company—Mr. PENNEY in the chair. There was a much larger attendance than usual.

WELCOME TO THE TOWN.

Dr. WALLIS, J.P., an ex-President of the Association, said that before the meeting proceeded he, as Chairman of the Gas Company, gave a hearty welcome to the Association to South Shields. This was not the first visit of the Association to the town. Five years ago the Gas Company had the honour of receiving a like important assembly of able and intelligent men, who were working out a very important matter—the gas interest—not only in England but through the whole world. When they looked to the fact that English capital had carried the industry of gas-making to the furthest limits of civilization, they might be very proud of their position. At their last meeting there, he (Mr. Wallis) happened to have the honoured position which their Chairman had now. Of course, he was exceedingly proud of his position. But when he looked around him, he felt that it was a very small honour compared with that which was now their Chairman's. There were then only about twenty or thirty members present. Now he saw the room filled; and this, to his worthy and excellent friend occupying the chair, must be a source of very great pleasure indeed. He (Mr. Wallis) believed he was the oldest Director of any Gas Company, he might say, in the Kingdom. He would enter upon his 87th year on the 27th of the present month; and he had had the pleasure and honour of presiding there for he hardly knew how long—longer than he cared to tell. He had very great pleasure in saying how gratified he was to see so full a meeting; and he hoped that the gathering that day would result in something worthy of so great an Association. He welcomed the members most heartily as the Chairman of the Company.

Councillor W. R. SMITH, J.P., one of the Directors of the Gas Company, said that, on behalf of the members of the Corporation, they gave the Association a very hearty welcome. They felt it an honour to the town that the Association had come among them.

The PRESIDENT, on behalf of the Association, conveyed to the two gentlemen who had spoken their grateful acknowledgments and thanks for the facilities which had been offered to them for the carrying on of the business of the Association that day, and for the arrangements which had been made for their comfort and entertainment, as well as for the kind words which had been spoken.

THE PRESIDENT'S ADDRESS.

The PRESIDENT then delivered the following

INAUGURAL ADDRESS.

Gentlemen,—Permit me, in the first place, to tender you my most grateful thanks for the honour you conferred upon me at the last meeting of this Association, by electing me your President for the current year. I deeply appreciate your kindness. I am not unconscious of the responsibility resting upon me; and my desire will be to justify, in some measure, the confidence you have so generously reposed in me—especially in the face of the fact that I am following such able Past-Presidents, who, during their respective years of office, did so much, through the medium of this Association, for the advancement and improvement of our important industry.

As purveyors of artificial light, heat, and motive power, we have very important functions to perform, involving weighty considerations. We are servants of the public in a dual sense—we supply one section with our produce by the aid of money borrowed from another section. Hence we are under obligation to do the best we can for the two, the consumer and the shareholder—viz., to supply the former with a good article at the lowest remunerative price consistent with giving the latter a fair interest for his money. These constitute the essence of our mission, as commercial undertakings. How can we best accomplish this task? To those companies who come under the parliamentary sliding-scale (as we do in South Shields), there is a practical solution of the question in its equitable provisions. As propounded by Michael and Will, in their standard work on "The Law Relating to Gas and Water," the theory of this admirable device is: "To give to the consumer a pecuniary interest in the economy and skill of the gas company; so that if, by these means, the company are enabled to make and supply gas at a lower cost, they shall, on the one hand, make a reduction in the price of gas to the consumer, and, on the other hand, be able to pay the shareholders a proportionate increase in the otherwise authorized rate of dividend. And, again, if they shall make any increase in the standard price, they shall make a proportionate decrease in the standard rate of dividend." From this, it will be observed that there is every inducement to sell the gas as cheaply as possible, and that the consumer and the shareholder are equally protected under this unique arrangement. This is not sufficiently well known to the general public; therefore, the information cannot be too widely disseminated.

Probably no section of commercial enterprise has been so openly assailed, and so severely criticized, as authorized gas undertakings. The head and front of the offence would appear to be the declaration of such apparently large dividends, which have been designated "extravagant" "excessive," "inflated," &c. But we all know that these dividends "are not what they seem," inasmuch as buyers of gas stock have to pay a very large premium indeed for the privilege of acquiring it, which cuts down their interest to something like 4 to 4½ per cent.—not an extravagant return for their money. The original shareholder must now be a very rare exception. Undoubtedly the proper remedy for the current misapprehension relative to gas companies' dividends is to follow the example of well-known companies, who have seen the effect of so-called high dividends on the public mind, and have obtained parliamentary sanction to consolidate their stocks and bring the dividends down to one uniform rate of something like 5 per cent.—compensating, of course, the present holders of the stock for the reduction in question. There is also another fact which is either not sufficiently well known, or is lost sight of by the public—viz., that the premiums paid by the purchasers of gas stock, not being dividend-bearing, are used for capital purposes, *i.e.*, in "extending or improving the gas-works." Hence such premiums have necessarily a direct influence in cheapening the price of gas to the consumer.

Opposition by local authorities to gas companies when applying to Parliament for fresh powers to enable them to meet the ever increasing demand for the supply of gas, appears to be the order of the day; but the wisdom of such opposition in many cases is doubtful, as it not unfrequently ends in a minimum of justification and a maximum of cost to the undertaking and to the local authority. Such costs throw a double burden on the gas consuming ratepayer, in the shape of increased rates and a higher price for the gas. The costs incurred by gas companies in defending themselves against such opposition have, according to law, to be charged to revenue; and until these are written off, there must necessarily be a delay in reducing the price of gas—of years probably, according to the amount. Hence it will be seen that opposition of this kind practically defeats its own object. Vested interests have their rights, parliamentary and otherwise, which cannot be ignored; and the public have their rights and safeguards also. Therefore what a vain thing it is to say that gas companies are doing this and doing the other, when they are working on legal as well as on equitable lines.

Gas companies have great difficulties to contend with at times—such as fluctuations in the price of coal, and likewise in the price of residual products, as well as the increasing cost of labour—over which they have little or no control. At present coal stands at a reasonable price; but sulphate of ammonia, which at one time brought in as much as £22 per ton, is now selling at the lowest price of the century—namely, between £7 and £8 per ton; and surplus coke is in many quarters somewhat difficult to get rid of, even at a reduced price. These are examples of the disturbing influences to which gas companies are subject, and which are somewhat trying in the face of the desire to cater for the public in the supply of a good article at as low a price as possible. When such fluctuations have occurred, of an unusually adverse nature, the policy adopted by some companies has been to draw on the reserves to meet the loss sustained in the reduced revenue, till such time as prices have come back to their normal figure; and in taking this course, their reserves have been exhausted. The only other feasible method open to gas companies when so placed, would be to increase the price of gas and reduce the shareholders' dividend. This plan, though justifiable, would necessarily be unpopular. I refer, of course, to companies working under the sliding-scale. When reserves have been exhausted in this way, it wisely behoves the companies to renew them as quickly as possible. Too much stress cannot be laid upon the advantage—in the interest of both consumer and shareholder, who may truly be said to be partners under the action of the sliding-scale—of having substantial reserves to fall back upon, in the event of unforeseen difficulties. Such reserves are "the sheet anchor" of the concern.

Probably an address of this kind would not be complete without reference to the electric light. With our knowledge of its past, its present, and its probable future, we, as purveyors of gas, have little to fear from it, whatever may be said to the contrary. With regard to the present price of gas, as compared with that of electricity—light for light—it is an indisputable fact that gas is by far the cheaper of the two. This has been ably and conclusively demonstrated by actual and practical comparison. Hitherto there has been a great deal of mystery to the uninitiated about the price of electricity. The Board of Trade "unit," too, has been a something that "no fellow could understand;" and the comparative prices of gas and electricity, as propounded from time to time by promoters of the latter, have been as uncertain as the weather, as changeable as the seasons, and about as unreliable as the light itself. The price will ever be the paramount consideration with the general public; and that is the standard by which each light will be judged. The promoters of the electric light certainly furnish to the public information in abundance; but we cannot accept their *ex parte* statements. They attribute many virtues to the light; and the persuasive arguments they use are sufficient to fascinate and win over the most hesitating to adopt the illuminant. Time, which is said to try all things, will show whether such flattering representations are real or visionary—"the proof of the pudding is in the eating thereof." They tell us that it is a "cool" light, signifying that it gives off very little heat; but by experiments referred to in the "JOURNAL OF GAS LIGHTING" for May 28, 1895, "two incandescent electric lamps—one of 16-candle and the other of 25-candle power—decomposed gunpowder, and also caused water to boil in 15 minutes." It is said that ceilings do not get blackened when the electric light is used. This is also a delusion. The heat from the electric light bulb as it ascends carries with it the particles of falling dust, which adhere to the ceiling, and after awhile show a distinct discoloration, as may be observed where the light has been in use for some length of time. I myself have seen, in two well-known buildings in London, where electric light is exclusively used, beautifully embellished ceilings all blackened in this way.

The electric light is very uncertain. Its vagaries are within the knowledge of most of us. As the Master of the Rolls said, when hearing the De Mare appeal in June last: "When you come to electric lighting, the only thing one perfectly well knows in one's house is that it goes out whenever you want to keep it in." Two electric light engineers, when called in last year by a certain corporation who were having some trouble with the light, are reported to have expressed the opinion "that there is not a perfectly worked system in the kingdom. Even in London the light has not been trustworthy." Often "the wish" has been "father to the thought" that the electric light might annihilate gas undertakings. During the electric light scare some years ago, the cry went forth that gas was doomed, and gas officials were taunted with the remark that their occupation was gone. However, such innuendoes are just as much out of place to-day as they were then. A too confiding public at that time took up the new light, only to drop it again after, in some instances, losing their all. Since then it has been the fashion for local authorities in turn to take it up; but comparatively few private consumers, in provincial towns, have gone in for it as a rule. In some towns which I could cite, the light is chiefly used for municipal buildings. Speaking of the electric light as designated, rightly or wrongly, "the light of the future," probably it will be the light of the rich. But gas will long remain the light of the middle class; and it will be the duty of gas companies to give every possible facility and encouragement to the poorer class to use gas for lighting, for heating, and for cooking. There is a great future for gas in this direction.

A large section of the poorer class use oil; the chief virtue of which is, of course, its cheapness. The facilities afforded by its vendors in serving it out day by day at the door of the purchaser, render it acceptable. It has its dangerous side in the oft-recorded fearful accidents by explosion. The great trouble involved in its use, and the odour it imparts to everything it touches, make it objectionable. It is an oft-repeated truism that gas companies have more to fear from oil than electricity. At one time we heard much about cooking by electricity; but I am not aware that any appreciable advance has been made in this direction. On the contrary, what rapid strides have been made in heating and cooking by means of gas, which is clean, convenient, efficient, and also economical, if properly used. The gas industry is indebted to the introduction of the electric light, which has been the means of stimulating it to more energetic action, and producing greater improvements in lighting and the pushing of the heating and cooking section, than ever there would have been had things been permitted to go on in their old way. Competition is good all the world over in giving us a cheaper and better supply of most things, including

that of gas; and this is the age when the cry is for everything "cheap," "cheap," "cheap!" Let us profit by this desire, by falling in with the spirit of the age in that respect, continuing in the future, as in the past, to do our best for those who use our gas, and for those who, on the other hand, supply us with the "sinews of war"—the proprietors—holding the scales of justice between them with equal poise.

The incandescent gas-burner is eminently calculated to compete successfully against the electric light by reason of its great brilliancy and the marked economy in its consumption. It is said to consume one-third of the gas that an ordinary burner does. It will thus be seen that this is a direct cheapening of the gas to the consumer, after making due allowance for the cost of burners and mantles; and though this at first sight may appear to be against the interest of the gas companies, yet a cheapening of an article usually leads to an extended use of it. People are not so careful when a thing is cheap; but on the contrary, they often strain every nerve to economize when a commodity is dear. Well, we had better have the smaller consumption of the incandescent gas light in the meantime, than an extensive replacement of gas lighting by electricity, which, by the way, is very remote. There is great virtue in a good and efficient gas-burner; it makes everything go smoothly. But give a bad one, and we have a source of irritation and dissatisfaction to the consumer, and "uncanny" reflections on the gas and on the company supplying it; though it is, of course, the consumer's own look-out to provide himself with a good burner. Does one consumer in a thousand, in a general way, ever think of renewing his gas-burners from one year's end to another? I fear not. These innocent mediums for shedding light on our darkness, are certainly answerable for many sins visited unjustly upon gas companies. Could they but speak, what secrets they might reveal, what misunderstandings set right! We have it on excellent authority that "the consumer by using bad burners can reduce the light from the standard of 16 candles per 5 cubic feet of gas to 10, or even to 6 candles—or, say, 50 per cent. On the other hand, he can increase it by using the improved burners to 50 or 60 candles per 5 cubic feet of gas burned per hour, or something like 250 per cent." Gas companies should evidently make a special point, in justice to themselves and their customers, of keeping the latter informed as to the latest and best burners; and also show the various types in action, giving particulars of their consumption, price, &c. Has this not been somewhat overlooked in the past? We need not go counter to the interests of the tradesmen of the town; consumers can obtain their burners where they please. There are plenty of good makes in the market—batswing, fishtail, Wenham, flat-flame, and last, though not least, the argand. The latter, when used with a plain chimney simply, gives a very efficient light. It would be all the better, too, if we had the control of the internal fittings, so far as saying what size the pipes should be, and how they should be laid to suit a wet as well as a dry meter. What gas manager has not been annoyed by being charged with sending out bad gas, when the wretched fittings of the consumer only have been at fault?

Much has been said of late about the meter-rent charge. It will probably in time "go by the board;" but companies will no doubt hold on to it as long as possible. The charge is very noticeable where it exceeds the amount for gas consumed, as it often does, in the case of the very small consumers. It is a bugbear to many who wish to burn the gas. Several notable companies have dispensed with this unpopular bar to progress; and with good results, I understand. No doubt abolition of the system all round would be highly popular, and would give more satisfaction than a reduction in the price of gas. There is, however, one strong objection to it—viz., that we could not very well put it on again if occasion required, the same as we can with the price of gas. When a company has its reserves full, and is comfortably paying its maximum dividend, then would be the opportune time to act upon this suggestion; otherwise it might prove premature.

The prepayment meter, which is now being so extensively adopted by many companies, seems to have justified its introduction. It bids fair to be one of the greatest conveniences of modern times—in fact, the instrument *par excellence* for simplifying collection, and quite an admirable substitute for the deposit. It probably has a charm for the class of consumer who would not miss an occasional instalment, but who might demur at having to pay a quarterly account all at once. It is no doubt a splendid institution for promoting the extended sale of gas.

Gas lime seems a drug with some companies who, owing to town restrictions, have to send it to sea to poison the fishes, in the absence of a demand by the farmers in the neighbourhood, except for occasional requirements. It is a pity it is not more used in the latter direction, as it undoubtedly deserves to be.

The retention of heavy stocks of sulphate of ammonia by companies whose make is large, is doubtless a great evil, and has much to do with the present unsatisfactory price. For years it has been our practice at South Shields to sell in monthly parcels; and our average price for the year has usually been satisfactory. Trying to force the market is no good. The stuff is only left on your hands; and then you may have ultimately to submit to a reduction in price. An article is worth just what it will fetch in the market; and no more. We cannot get away from that. There is an "ebb and flow" in everything, similar to the tides; and we cannot expect to have the one without the other. We cannot always "go on" in the same direction "for ever," like Tennyson's brook. No doubt supply exceeds demand. The depression, too, in farming in this country prevents its free use; but whatever is the true cause, undoubtedly it has reached the lowest price on record.

With regard to coke, it does not always do to pin our faith too much on export trade; shipments are too often precarious. To cultivate the home trade, especially among householders, is probably to be preferred, as it is of a more permanent character. I do not think it is wise policy to stock any of the residuals for a length of time, as they only deteriorate and create contingent expenses.

One of the burning questions of the day is undoubtedly capital and labour; wages disputes being ever and anon with us. They seem to permeate every section of industry throughout the length and breadth of the land. No doubt they are a sign of the times. The importance of this question is demonstrated by the passing of the Labour Disputes Bill during last session of Parliament, and a reference to the matter in the Queen's Speech. I trust that other efficient measures will be passed in due course, to the mutual satisfaction of master and man. This difficult problem will no doubt have to find its final solution in State guidance and regulation, although it is a colossal task, from which both sides of the House may well shrink. In the meantime, the profit-sharing system is one of the best solutions of the difficulty, as it gives the workmen a direct interest in co-operating with the employer. In France, awards are made to gas-works employees for long service; and in Holland, old age pensions are granted. If dealt with by the Government, it will at least have the virtue of impartiality.

The form of gas company's accounts prescribed by the Gas-Works Clauses Act is a very excellent one; and no doubt, in course of time, will be universally employed. There are companies who still cling to their own forms; and the consequence is that they are no use for comparison with those kept in the one in question. I think all companies would do well to adopt the prescribed method voluntarily. At the same time, we should not rely too much on it, inasmuch as the comparison of the different gas companies' accounts, even if kept on one common or uniform plan, may show anomalies and discrepancies that cannot always be understood, arising, no doubt, purely from the different methods of working employed, and of classifying the several charges—each company probably being a law unto itself in such matters. However, for the purpose of ordinary comparison, it is undoubtedly of some service.

Gas as an investment has quite risen in the estimation of the public. Mortgage and debenture bonds are now much sought after. Many people of means have for some time past been embodying special clauses in their wills, to enable trustees and executors to take up gas stock and bonds; and such usually leave gas securities as part of their personal estate. The spread of the electric light has not affected the gas share market. Take, as an instance, the South Shields Gas Company's stock sold by auction at different periods. It will be seen that there has been (with two very slight exceptions) a gradual increase in the average price realized, as shown by the following figures:—

1879 . .	£126 1 8 per cent.	1885 . .	£196 2 6 per cent.
1881 . .	131 10 0 „	1887 . .	195 12 6 „
1882 . .	148 15 0 „	1890 . .	194 16 8 „
1884 . .	183 6 8 „	1895 . .	208 9 9 „

The last named was sold when the electric light was being put down in the main streets of the borough. The stock is now quoted at £227 *ex div.*; and little or none can be had even at that price!

Judging from the last parliamentary returns of authorized gas undertakings, our industry does not appear to be languishing, inasmuch as the increase in the gas sold for the year on the previous one was over 3274 million cubic feet. By the way, these returns are very much discounted by their late issue; but at the same time, it must be a work of some magnitude to get them together in an accurate form.

Much of the prosperity of gas companies necessarily hinges on the price of coal. No doubt, a steady fair price is better than extreme fluctuations, which put our calculations out of joint. A great rise is followed, sooner or later, by a fall below the average. At one time, serious thought was given to the future supply of the raw material coal, and its comparatively early exhaustion, upon which startling opinions were expressed by well-known individual authorities. According to statistics recently given in the "Journal of Gas Lighting," the output of coal for Great Britain in 1895 amounted to over 212 million tons, which is more than one-third of the combined output of the principal coal-producing countries of the world. Notwithstanding these facts, probably the present generation has nothing to fear, as new seams are constantly being discovered, not only in our own little island, but in every quarter of the globe. A bountiful Providence has stored the earth with coal for our use. Man, on his part, by his untiring energy and perseverance has discovered enriching agencies, and has applied them for raising the illuminating power of the gas; and in these days of boundless chemical research and scientific investigation, we do not know what new developments there may be in store in the near future, calculated to revolutionize the manufacture of coal gas. We are familiar with the past; but the future is veiled from our view.

Mr. E. H. MILLARD (Durham) next read the following paper:—

MATERIAL AND TOOLS FOR MAIN AND SERVICE LAYING.

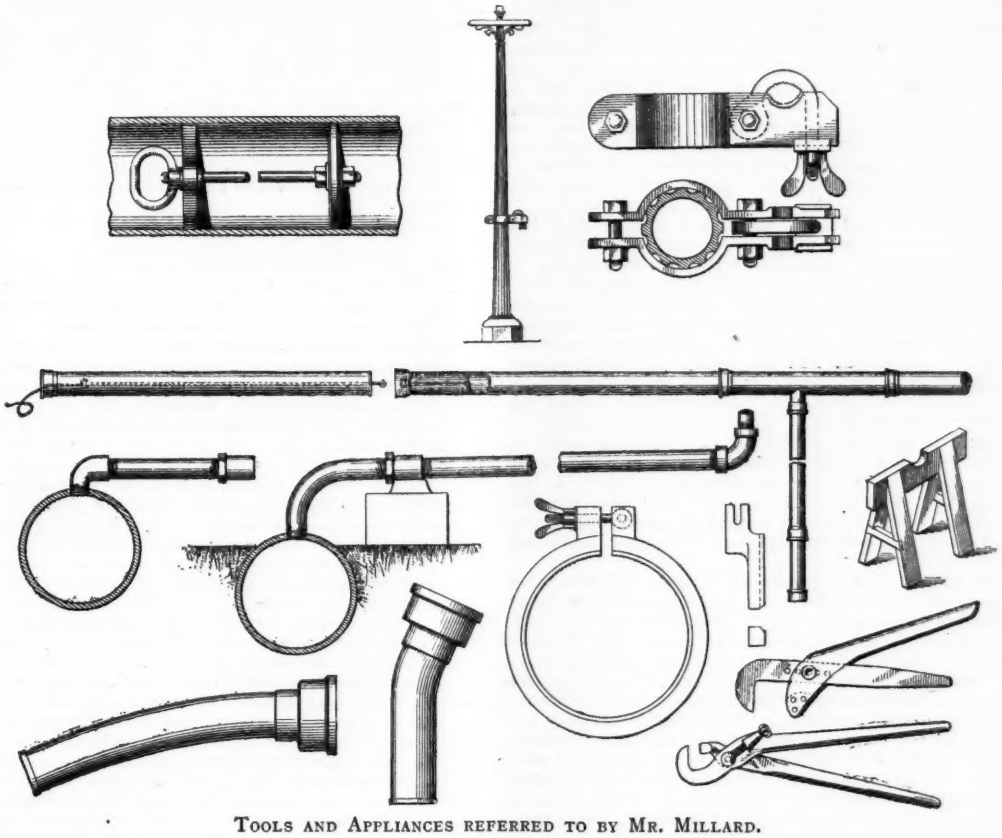
It is utterly impossible with such subject-matter as is covered by the heading of this paper, to introduce anything of a startling or novel character. Yet it is well, at times, to compare methods of doing the same thing; and I am hoping that a good discussion will ensue, in which some of the older heads will give us the benefit of their experience and the results of their practice.

As to main laying, the material almost universally used is cast iron, except for the very largest sizes of mains, but there are variations in the methods of jointing; and our Association is well represented by our venerable friend Mr. Warner and by Mr. Pettigrew, who are each responsible for a patent in this direction. I am afraid I am confessing myself terribly behind the times when I state that I use only the old-fashioned open spigot and socket pipes caulked with yarn and lead; my little experience with turned and bored pipes filled with roman cement having led me to pronounce them utterly unreliable—at any rate, for a mining district or an old-fashioned town with very few straight roads in or about it. I have lately had occasion to overhaul, for the County Council, a length of 3-inch main, laid under the supervision of the County Surveyor with turned and bored joints, which had been subject to lateral displacement; and I found that nearly every joint leaked, and many of the sockets were split. The cause of the displacement was the existence of a gutter on the same side of the road at a greater depth than the main was laid; and repeated attempts had been made to render it gas-tight. I recommended the transference of the main to the opposite side of the road. But the expense was objected to; and I have tried the expedient of driving a 2-feet stake at every joint opened. I am satisfied that with the ordinary lead joint the leakage would not have been nearly so serious; and it could have been much more easily remedied.

Some years ago, to test the efficiency of turned and bored pipes, a number were put together with the sockets under water; and, on air being pumped in, bubbles were seen ascending at every joint. It requires an exceptionally good heavy lathe to turn out joints that shall be correct, especially considering the conditions under which they are required to be produced, as to speed, the quality of metal in the pipes, and last, but not least, the price.

With respect to laying, I would draw attention to one or two points which, as far as my personal observation goes, are not by any means universally followed. The first is as to the yarn, which I prefer untarred, and which should be obtained with the proper number of strands to suit the joints of the pipes being laid; thus saving the trouble of unravelling and retwisting, and minimizing waste owing to odd strands being left about. The next is as to the lack of care in chopping down by the sides of the main with a spade when filling in. In the event of a leakage, this oversight causes difficulty in locating it, as the gas travels a long way in the loose soil under the sides of the main. I have recently been relaying a large number of mains; and, considering the years they had been down, the appearance of the bed on which the pipes had been placed came quite as a surprise.

I would also submit to your notice a very handy appliance for use when laying mains, in the shape of an india-rubber disc squeezed between two plates, and drawn along the pipes as they are laid; thus enabling each joint to be tested before filling in without any waste of gas, and at the same time making sure that no stones thrown in by mischievous boys, or waste or other material due to a careless workman, are left in the main to cause obstruction. I am indebted to Mr. Terrace for my knowledge of this appliance, which is an improvement on the canvas plug described in "King's Treatise on Coal Gas," and usually known as "drawing the badger." There is another main-layer's dodge that may be new to some of you—viz., turning a beast's bladder inside out, by which means you get a smoother and better fitting skin, and add considerably to the life of the bladder. This "tip" is particularly valuable when testing mains for leakage by isolating lengths in the usual manner; and, to "make assurance doubly sure," when engaged in this work, two bladders may be used, the space between them being filled with water. In laying the smaller-sized mains we joint two or more together before lowering them into the trench; using for this purpose trestles in preference to the usual low wooden blocks, which are a fearful back-breaking arrangement. These trestles also come in very handy for barricading off any of the trench left open overnight.



TOOLS AND APPLIANCES REFERRED TO BY MR. MILLARD.

The question as to the coating or otherwise of pipes is one which deserves consideration. Where the soil is good, I have generally dispensed with it; and I am of opinion that with coated pipes it is possible for many defects to be covered unless every pipe is inspected at the maker's works before being dipped. There is, at any rate, no reason for putting a coat on the inside, as the gas removes the whole of it; and if this were universally demanded, I see no reason why the extra charge for this method should be maintained. I remember in my early days being greatly puzzled at seeing tar pumped out of a syphon some miles from the works, while none had been observed in the nearer syphons; the explanation (which was not forthcoming at the time) being, of course, the solvent action of the gas on the coating.

Where a main is being taken up which is worth relaying, I can recommend the use of Helps's patent pipe-extractor as being quicker and cheaper than bursting off in the usual way, having the sockets to clean out afterwards, and hooping the cut ends. The only points to be observed are that too great a length must not be uncovered in the smaller-sized pipes, which are not heavy enough in themselves to resist the lifting action; and the

workmen's minds must be disabused of the idea that the screw is to be used to actually force off the socket, in the manner of a screw-jack.

For running the joint, I employ clay in the smaller sizes of pipe; insisting on a roll of about 2 inches diameter, which leaves a good fillet for caulking in. In the large sizes, I use the clip shown, which leaves a better fillet than the usual flat hoop.

In running a main where branches are left for proposed streets, I prefer to put into the branch a length into which a bladder can be placed when the extension is made; thus obviating the inconvenience of disturbing the gas supply, which, in these days of almost universal day demand for cooking, &c., is a feature that must not be lost sight of. Instead of inserting a plug in the socket of this length, in the usual way, I use a plain piece with a cap on the end, which affords hand-hold for pulling out when the extension is made.

There has been a growing tendency to reduce the sizes of syphons and lengths of irregulars, particularly bends, which are frequently made with a knuckle. Bends swept to a radius, as used by water companies, are very much handier, as they can be cut at any length to get the exact set or angle required. If there is one thing more annoying than another, it is to find that the spigots of tees, bends, and other irregulars, will not fit the sockets of ordinary straight pipes, or *vice versâ;* and I take this opportunity of directing the makers' attention to the point.

For cutting mains, the chain-wheel cutters are to be recommended as better and quicker than a hammer and chisel. I have frequently heard this challenged; but I have found that smartly rapping with a hand-hammer while the cut is being made greatly hastens the fracture by the cutters.

Coming next to the services, we are limited practically to lead and iron; but I have only had experience with the latter. "Gas" strength is rightly being gradually discarded for the "steam" quality, which offers a greater thickness of material to resist corrosion. I have tried it galvanized, but have found it to cause a brittleness; and I shall be glad to know if this has been generally observed.

With respect to the holes for services, I am afraid I am hopelessly old-fashioned, as I still use the gouge and the hand-hammer in preference to the drill. My contention is that a good workman can make an equally satisfactory job in the time it would take to excavate to the extra depth for the drilling apparatus; and there is the further advantage that the main is not undermined at a critical point. This is a consideration with the smaller sizes of mains; and the solid earth also affords opportunity for putting a good solid packing under the service bend. Of course, the hole must be cut small enough, and a good hexagon fluted rymer used.

I am a great advocate for good tools (of which the rymer is very important); and I consider that it pays to provide them. I have been surprised to notice in some places, not of the smallest size, that the old-fashioned stocks and dies are still employed. The cost of files knocked up in a twelvemonth in preparing ends for such tools would pay for a new set of improved stocks and dies.

I give you a sketch of a portable vice I have had made for attaching to lamp or telegraph posts. I know the usual practice is to attach a vice to a hand-cart. But Durham is a very hilly place, and, having a wide district, the men do not care for pushing the cart about; and I notice it generally takes one man to hold the cart while the other screws. The vice has proved an exceedingly useful tool, particularly for reconnecting services when relaying mains or putting a large number of services for "slot" meters in one street; moreover, it is cheap. While on this matter of tools, I would say that by far the best and handiest tongs I have come across are the "parrot-nose," with screw for adjusting the centre rivet or bolt so as to take in several sizes of tubes. A very handy tool for lighter work, such as meter couplings, is the "footprint" stamp of tongs.

Ratchet screwing-stocks are indispensable when relaying mains and services, to screw the ends of the services in position, thus saving the labour of opening a trench to the next socket. I understand to a gas manager belongs the credit of inventing this valuable tool; it being originally designed for screwing some holding-down bolts of a holder column which were too long.

A detachable joint should be, and I believe generally is, provided on every service near the main. In Durham, this used to be provided by a brass barrel union, which was both costly and the cause of a considerable amount of leakage. Many provide a long-screw following an ordinary bend. This appears to be waste, as the long-screw can be made on the bend, thus reducing the cost and there is one joint less. Makers would find these would be more used if they were illustrated in their lists, as well as one or two matters that are not generally known. For instance, I find barrel nipples of varying lengths, from 1½ to 5 inches, simply invaluable when relaying; and very few gas-works screwing-machines will screw them so close. Also male and female elbows for shallow mains, instead of a nipple and an ordinary elbow, with which it is almost impossible to make a permanently tight joint, and which I saw employed quite recently; and bends for lamps, which save the cost of a ¾ in. by ½ in. reducer. For "slot" meters, I use a ¾ in. by ½ in. malleable elbow (which is almost equal to a bend), with ½-inch gas-tube upright. This considerably reduces the cost as compared with a ¾-inch steam-tube right through, followed by a ¾-inch main tap.

The use of ordinary paste white lead is strictly prohibited. I dare say most of you have seen the manner in which it is thrust off when entering a socket. We employ instead a paint applied with a small brush, which is better and also saves the time, as well as the waste used for cleaning the hands. It is likewise used for painting the service-pipe wherever the skin is abraded by the tongs. This simple precaution is of very great moment in prolonging the life of the service-pipe, which always commences to decay at these places. Many, I know, encase the service in a troughing; but if the precautions I have mentioned are taken, and reasonable care is exercised in choosing the soil for embedding the pipes, particularly at the gutters, "fads" of this description, with their attendant trouble and expense, can be dispensed with.

In cutting the pipes with the usual wheel cutters, I suppose one ought to rymer the tube to clear the bore from the rag caused thereby; but I am afraid this does not often get done. I adopt a halfway method of not cutting the pipe right through, and then snapping off the piece with a sharp jerk.

Closely allied with our subject is the connection between the main tap and the meter; and in the larger sizes (1 inch and upwards) there is some difficulty in getting the lead pipe neatly bent. But this can be overcome by inserting a patent steel spring, when the pipe can be quickly and neatly bent to the required form, and the spring is then withdrawn.

In conclusion, I hope none of you will go away with the idea that I have been attempting the process familiarly known as "teaching one's grandmother to suck eggs," as no one is more aware than myself of the fact that the few ideas which I have strung together, and which I in no way claim as original, are better fitted for a friendly chat in a quiet corner than for the more formal purpose of a paper. But I trust what I have brought before you may promote many such ideas. In an assembly like this, there must surely be some who have a "dodge" or "tip" worth imparting. If only one is evoked, I shall be amply repaid; and I will make a careful note of it for future use.

Discussion.

The PRESIDENT said the paper had been a very interesting one. Mr. Millard had taken a great deal of pains to bring with him all the various appliances named in it; and he thought they might now have a very interesting discussion.

Mr. DAVID TERRACE (Middlesbrough) said that he, along with the rest of those preseut, had listened with very great pleasure to Mr. Millard's paper. It was thoroughly practical, and dealt with a number of subjects such as they all met with every day. He noticed that the author mentioned the Pettigrew joints; but he might have given some slight description of these joints, because some of the members might not know what they were. Mr. Millard had also mentioned an instance of a gutter being under a main; and he thought that this was a circumstance in which he might well have put in a Pettigrew joint—a dove-tailed joint. Although it might have lengthened, it would not have allowed gas to escape. For pipes laid in ground which shifted, the Pettigrew joint was really the thing that was wanted. Mr. Millard spoke of turned and bored joints, and of very bad joints of that description. He (Mr. Terrace) used them himself; and it might be said that although they had reduced their leakage at Middlesbrough from something like 10 to about 6 per cent., it was not due to the joints. The author referred to one exceptional experience he had had; but he did not think that the leakage in this case was due to turned and bored joints. Mr. Millard mentioned his (Mr. Terrace's) name in connection with the india-rubber disc. He was very pleased that these discs had taken hold in the North of England. It was in Scotland that he fell in with them. The late Mr. William Mackenzie, of Dunfermline, some ten or twelve years ago, called his attention to the manner in which he was laying mains with them. The device was not patented; but it was so good that he thought Mr. Millard might have given them a better description of it. Near the end of the paper, he talked as if the wood trough and the tar and sawdust for taking gas-mains were a "fad." He thought it was one of the most necessary things, under certain circumstances. He did not know that those who had to work in certain soils, and who used the trough, would care to have it referred to as a "fad," because they generally found that the place which was not covered in by the trough and sawdust was the place which went to the bad. In these circumstances, he thought they were bound to respect the means which were at present in use.

Mr. M. FLIGG (Redcar) considered the paper a very useful one. He was at present laying a gas-main, and was using the discs Mr. Millard referred to. He found them to be very effective—in fact, more effective than the old method of putting in bladders. Anyone using them would find a great benefit from them.

Mr. G. PETTIGREW (Middlesbrough) said that, as the inventor of the dove-tailed joint, he had a little to say about it. He quite thought that Mr. Millard would have made some more remarks about it. Having brought it before the meeting, he might say that over 800 miles of pipes had been laid with this joint—the North-Eastern Railway Company alone had 60 miles of it. It was very useful to them, because of the difficulty they had in laying pipes along embankments and the like, where the ground was likely to settle. This joint of his tightened itself, and there was no leakage with it. Besides, it only took half the length

and half the yarn, and there was a large proportion less of labour in the making of it. It stood any pressure. He had had it tested up to 7 lbs. per square inch without a burst. It was evident that Mr. Millard, in sticking to the old lead joint, did not do himself justice, because he discarded the principal part of the business altogether—that was the making of a tight joint. A tight joint could not be made by the old method except at the time of their making it. The lead flowing in formed little nodules; and these were sometimes cut off, and leakage took place. But in his joint this was obviated, because any movement simply tightened the joint. He should be very glad if Mr. Millard would test his joint; and he was sure that he would never use the old method again.

Mr. T. Bower (West Hartlepool) said that all the services at Hartlepool were of lead, except a few which they used for public lamps. He was not at one with Mr. Millard in regard to his method of main-laying. During his experience at Lytham, he used nothing else but turned and bored joints; and if, as had been said, the "proof of the pudding was in the eating of it," turned and bored joints must have been satisfactory, for his leakage account was very considerably under 5 per cent. He only wished that he could get the leakage account at West Hartlepool down to the same figure. Of course, this might be due to the fact that the turned and bored joints, of which Mr. Millard had had experience, had not been well and efficiently laid. He was quite alive to the fact that there were turned and bored joints and turned and bored joints; and it was one of the first requirements in their use that there should be a thorough inspection of every pipe before it was taken on to the ground to be laid, because they all knew that, however much they might caution workmen, and however careful they were, it was utterly impossible for them to get at all times the class of material they required. For this reason alone, it was necessary that they should have strict supervision before the pipes came on to the ground. But, given good pipes, from his experience of both systems—extending now over a period of more than twenty years—he certainly should prefer turned and bored joints for ground where there was no liability to sinkage from mining or other operations. One of the principal reasons why he attributed his leakage to turned and bored joints was the fact of mining operations disturbing the ground. Then he would not have turned and bored joints. He had used a considerable number of the Mitford and Pettigrew joints—he had laid about a mile-and-a-quarter of water-mains with them, and a better joint he had never seen. He had also laid a little over a mile of 24-inch gas-mains; and there, also, the joints had turned out to be satisfactory. He had not used them for small pipes; but he thought that, wherever the ground was at all treacherous, they might be used with satisfactory results. He certainly thought that they ought in all joints to discard the use of tarred yarn altogether. At Hartlepool, he used nothing but plain yarn. They had about four thicknesses, for different grades; and they found that they were able to make very satisfactory joints in much less time. He had had no experience such as Mr. Millard mentioned in regard to bladders, because in anything more than 6 or 7 inch mains, they used nothing but indiarubber gas-bags, which they found to be much more satisfactory and more reliable than the old-fashioned bladders. He used both coated and uncoated pipes. For water, he used the uncoated pipes; and for gas, coated pipes. In treacherous ground, such as they had at Hartlepool, it was of great importance to use coated pipes. Mr. Millard thought the troughing of service-pipes to be old-fashioned. It might be old-fashioned, but, to his mind, it was very good; and he should not be disposed to discard it. Wherever he had occasion to lay service-pipes through treacherous ground, he troughed them. His neighbour at Stockton, Mr. Ford, would bear him out when he said that, when furnace slag and the like was placed on the streets, and the street-roller was passed over them, there were cases in which a ¾-inch pipe would require to be re-laid in less than three months; and in such circumstances troughing would require to be used. He had nothing further to add, except to thank Mr. Millard for bringing these matters before the Association. Some of them might appear trivial; but they were subjects with which they daily came in contact. Though they might be small, at the end of the year they would make a very large credit, or otherwise, in their finances.

Mr. J. Hall (West Pelton) said, with regard to main laying, there was one thing he might mention. He had always taken great care in the packing of the joints. He preferred the white yarn. Once he made an experiment with it, as to its strength; and he burst the socket of a pipe with it. This showed that white yarn was the best. The great difficulty in laying pipes was the dealing with the yarn at the lower part of the pipe. Very often the men had not sufficient room to make their joints in. For over thirty years he had had experience of turned and bored, half-turned and bored, and half lead and grooved pipe-joints. The latter was the most perfect joint. If grooved joints were run with lead, and the pipe began to draw, it might draw, not from one joint but from two or three. He was an advocate for lead services. He was quite astonished and surprised at the introduction of iron pipes at all, because, if they had any difficulty with their services, they would in the one case have the old lead, which would nearly buy a new pipe, and in the other case they would have nothing. In laying lead services, he believed, wood should be used in every instance.

Mr. H. Tobey (Malton) did not think they would all agree with Mr. Millard and his paper. He rather thought the author had intentionally given expression to pronounced ideas in order to bring out opposition. He did not agree with Mr. Millard in the matter of turned and bored joints. His experience was, when he took up pipes, that those which had turned and bored joints showed the least signs of leakage. Lead jointed pipes had very often shown the blackened kind of joints which denoted leakage. Therefore he concluded that turned and bored joints were much the better as regarded leakage. With turned and bored pipes, they could work round very great curves. He did not think that the depth of the turn and bore should be very great. The less it was, perhaps, the better—say, about 2 inches; and if turned slightly with a curve on it, so much the better would it be. If the ground gave way by depression, such a pipe would hold itself perfectly tight. Mr. Millard referred to putting branches into mains, for district supplies; and he (Mr. Tobey) agreed with him that it was advisable to put in a T which would meet the wants of a district when it had grown. For services, Mr. Millard advocated a coated iron pipe, which was an advisable thing to use in some cases. Mr. Bower, where there was a bad soil, laid lead; but they had to consider the expense of laying lead pipes, which he believed to be, as compared with an ordinary ¾-inch tube, certainly about double. He did not think any of them would be in favour of laying galvanized iron pipes, because of their brittleness. He thought it was preferable to use coated pipes. Mr. Millard referred to a ratchet stop for screwing out and relaying mains. He took it that this was a very bad recommendation. It happened, as they knew, that iron service-pipes got very much corroded. As long as they were left, they probably went on satisfactorily; but whenever they were disturbed, they began to cause leakage which otherwise would not exist. He had been very pleased with Mr. Millard's paper; and he should certainly make a note of the steel spring which he put into a pipe when bending it. It was a very good idea, as he had shown by demonstration on the spot. They saw how easily a pipe could be bent, and yet the full bore kept. It was certainly a thing he should adopt.

Mr. H. Lees (Hexham) said that most of the remarks so far made had been directed to the defects of Mr. Millard's paper, which was perhaps the way in which a paper should be treated; but he did not think that sufficient attention had been given to the many valuable hints contained in it. There was one point referred to which he did not know was anything like common in the experience of main-laying. That was in regard to the sockets and spigots not fitting properly. He had had a rather unfortunate experience of this nature some eighteen months ago, which put him to some little expense and inconvenience. He got it put right; but it threw the work back further into the winter than he had made up his mind for. If this were anything like a common experience, the sooner it was referred to in the way the author had done it, the better; and he was glad that Mr. Millard had made reference to it. He also spoke of an oil-stove for melting lead. Well, he had used one of them for some time, and found it very useful, especially in the case of a short length of main. It was much more convenient to take out, instead of having 2 or 3 cwt. of coke and a fire-grate. The lead could be melted in the time which would be required for getting the fire ready. He thought, therefore, that the oil-stove would find a very useful place in main-laying. He had also had some experience with American tools—grips, cutters, drilling machines, &c.; and so far as his experience had gone, they worked very satisfactorily. But he must say that they did not appear to him to be very durable. They would have to wait, however, to see whether they were or not, and whether they were worth the money, or whether it would be better to get an English make. He had, however, found them very useful and very ingenious.

Mr. J. Whyte (Seaham Harbour) was very pleased with the paper, although, at the same time, he did not agree with Mr. Millard in all he said. For his own part, he had laid very few lead joints within the last twenty years—very few indeed. In one place where he was located, there were some turned and bored joints before he went; but he had so much trouble and vexation with them, that he made up his mind never to lay a turned and bored joint again. However, at that time the joint was fully turned on the outside. If it were a leaking joint, they could do nothing with it; but now they could. He had the opinion that turned and bored joints were now cheaper than lead joints. They simply ran the joint with lead; and they thus saved yarn and men's time. He had tried one or two; but he would never think of tying them with a ring. If they simply ran them with lead, he felt confident that they would please everyone.

Mr. Millard, in closing the discussion, said it was really refreshing to have such a discussion. He had made up his mind it would not be his fault if they had not. He had been accused, right and left, of various faults. He had been accused that he had not given a full enough description of the various things which were mentioned in his paper. He was sorry for this; but he was bearing in mind the advice which had been given—"boil it down," and he might have boiled it down too much. With respect to turned and bored joints, if the members were placed similarly to himself, and had continually to turn

corners with these joints, they would not be so continually recommending them. It was all very well in modern towns, but let them try them in an old town like Durham. Mr. Bower said that, in a mining district, he should very likely not go in for turned and bored joints. Well, Durham was a mining district; and therefore Mr. Bower supported him. He had been tackled for stigmatizing the placing of service-pipes in a trough as a "fad." It was a "fad." Why anybody should go to the expense and trouble of doing so, when they could do it as well otherwise, he could not understand. He did not think there were any of them who, if they could trust an iron pipe, could not trust the soil itself. Mr. Fligg, he was pleased to see, used the disc he had referred to in the paper. It was, he considered, a most admirable device. Mr. Pettigrew naturally lauded the Mitford and Pettigrew joint. It was a very good joint; but the question was whether it was worth the extra money. It was a strange thing that one-half of the meeting had been advocating joints which would taper one way, and the other half had been advocating joints which would taper the other way. He could well leave them in this position. He was very glad to see that his advice as to using untarred yarn met with approbation. With respect to the use of bladders, he did not intend that beast bladders should be applied to mains above 6 inches; but for those below this size, he defied anyone to say that a beast bladder was not out and out better than an indiarubber one. One speaker had referred to the advantage of placing the groove inside the socket. That, he believed, was pretty prevalent now. It was the joint which he was using at the present time. Mr. Tobey spoke of taking up turned and bored jointed mains. He was afraid those would be of more recent date than the lead joints to which he referred. If that were not so, he could only say that Mr. Tobey had had an unhappy experience with his lead joints. There was no doubt that lead services were very costly, as compared with iron services. Mr. Lees, he was pleased to find—at least, he sympathized with him—had had an experience of spigots not fitting sockets. He himself had had this experience several times, not with one maker only but with three or four different firms. It was most annoying. Mr. Whyte referred to the fact that he had laid nothing but turned and bored joints for twenty years. No doubt his experience of leakage with these joints would prove to be very interesting to the meeting.

Mr. Bower proposed a vote of thanks to Mr. Millard for his very able and interesting paper. With regard to what had been said as to turned and bored joints, he should like to remark that what suited one place might not do for another. The same remark applied to some of the other matters which had been raised. He wished to refer to what he considered the most interesting of the appliances which Mr. Millard had shown—that for the bending of lead pipes. He (Mr. Bower) had not seen it before; and it seemed to him to be most interesting. For this alone, quite apart from other matters, he thought that Mr. Millard was entitled to their best thanks.

Mr. W. Ford (Stockton), in seconding the proposition, said he wished, as a very old friend and neighbour of Mr. Millard, to endorse the views of his friend Mr. Bower. He should like to have said a word or two upon the handy things lying on the table and the other matters mentioned in the paper with regard to main and service laying; but he would just remark that he thought his young friend had shown his energy and ability in a way which deserved their thanks.

The President said he was sure they were all very much indebted to Mr. Millard for his kindness in laying so much before them in his very interesting and practical paper; and he was pleased that there had been so full a discussion upon it.

Votes of Thanks, Etc.

Mr. Lees proposed a hearty vote of thanks to the President for his address, and for his conduct in the chair. He said he was sure they would read again the President's address with considerable pleasure. There were some things which they were much indebted to Mr. Penney for putting into it. A great deal of misunderstanding took place with regard to the position of gas companies towards the public. Mr. Penney had very clearly laid down that gas companies were so regulated by Act of Parliament that they could not take the dividends they were supposed to take. In District Councils they were spoken of as "bloated capitalists." But this, of course, was a farce; and if Mr. Penney's address were well circulated, the public would know exactly upon what standing gas companies were. They owed Mr. Penney a great debt for having placed this matter before them; and he (Mr. Lees) thought they ought to thank him for this, as well as for his personal kindness to them all.

Mr. Terrace seconded the motion; and it was agreed to.

The members and their friends afterwards dined at the Royal Hotel—Mr. Penney occupying the chair, and Mr. Lees the vice-chair. In acknowledging the toast of "The North of England Gas Managers' Association," which was proposed in felicitous terms by Dr. Armstrong, the Vice-Chairman of the South Shields Gas Company, the President remarked that the Association was formed in South Shields in 1877, and that this was their third visit to the town. The members dispersed by the evening trains; everyone bearing strong testimony to the excellence of the arrangements made for the day.

THE HEATING OF PUBLIC BUILDINGS BY GAS-STOVES.

Considerable attention has been bestowed on this subject by the Municipality of Karlsruhe; and the stove constructed from the designs of Professor Meidinger and Director Reichard, of the gas-works in that city, has for some time been successfully employed in the various schools. According to information collected by Herr F. Genzmer, of Wiesbaden, and communicated to the "Gesundherts Ingenieur," experiments are in progress in about twenty of the principal cities of Germany and Austria, with, in the majority of cases, satisfactory results; the chief complaint made against gas being that it is in some places too expensive as a heating agent, though its superior convenience to coal, &c., is generally acknowledged.

The reports are most satisfactory from those places where the experiments are conducted on thorough-going lines. For example, at Charlottenburg, it is found that there is no smell when the registers are kept clean, but that the rooms are well warmed and the manipulation is easy. The consumption of gas amounts to 3½ cubic metres (123·5 cubic feet) per stove per hour; but this could be decreased, and less attention required, if regulators automatically controlling the supply of gas according to the temperature of the room were provided. In Frankfort-on-the-Main, the authorities decided, in view of successful trials, to heat the new Uhland School by gas-stoves; and the results obtained during last winter are said to be satisfactory—the consumption of gas amounting to 273 cubic metres (9700 cubic feet) per 100 cubic metres of room space. In Berlin, the consumption recorded since 1894 averages 479·5 cubic metres (16,900 cubic feet); and in Hanover, 554·2 cubic metres (19,560 cubic feet), with ventilation. At Karlsruhe, where there are between 100 and 150 gas-stoves in the various schools and other public buildings, the gas consumption varies from 312 to 521 cubic metres (11,000 to 18,400 cubic feet) with ventilation; the average being 450 cubic metres (15,890 cubic feet). At Mainz, the cost of installation is less than that of centralized heating apparatus; but the working expenses are higher. A similar report is sent from Offenbach-on-the-Main, where gas is employed for heating a number of schools, the military hospital, &c. At Munich, 74 stoves have been in use in the Neuhausen School since February last year; and, though expensive, the system is satisfactory to the inmates—the heat being readily adjusted, and there being no smell of gas perceptible. At Vienna, in the School of No. 7 district, the experiments instituted in 1894 are satisfactory to the school management for the reasons given above; the only drawbacks being the high price of gas, and the time that the stoves take to properly heat the rooms.

Taking the average consumption observed at Karlsruhe—viz., 450 cubic metres per 100 cubic metres of room space per diem—as a basis, it is evident that gas is more economical than centralized heating appliances. This accords with Genzmer's personal experience as chief of the building department of the Municipality of Wiesbaden.

DETERMINATION OF THE CALORIFIC VALUE OF FUELS.

The "Zeitschrift für angewandte Chemie" recently contained a criticism by Dr. Walther Hempel of a paper by Herr Konrad Kroeker on the above subject. The products of combustion pass into the flues from ordinary furnaces at a temperature exceeding that of boiling water; and hence, for the practical valuation of fuels, it is necessary to ascertain the quantity of water formed by their combustion. To do this, Herr Kroeker proposed to modify the ordinary Mahler bomb, by introducing a second valve opening to a thin platinum tube reaching nearly to the bottom of the bomb. He intended to use the calorimeter in the ordinary way, and afterwards to draw a stream of dehydrated air through the bomb and a weighed calcium chloride tube. The bomb was to be heated to 105° C.; and the weight of water removed from it was to be found by the increase in weight of the calcium chloride tube. One part by weight of water requires 600 calories for its vaporization; and according to the weight of water found, deduction was to be made from the calorific value given by the calorimeter in the ordinary way. When a fuel is rich in combined hydrogen and oxygen, the absolute heating power is by no means proportional to the heat available in its ordinary combustion; but the above-named deduction from the absolute heating power does give a value which is so proportional.

In the course of an examination of a fuel, unless a calorimetric determination only is expressly requested, it is customary to make an elementary analysis, and to determine the sulphur, coke, ash, and moisture. The total water is thus known; and this knowledge is essential for the proper valuation of a fuel for furnace use. But in cases where a complete analysis is not otherwise of value, Kroeker's proposal, to ascertain the total water from that found in the calorimeter, becomes of service. The determination of this water can, however, be made without the modification of the bomb which he proposes. The Mahler bomb of ordinary construction is connected up to a weighed calcium chloride tube, and exhausted through the latter

by means of a vacuum pump. The bomb should be heated; and practically the whole of the water it contains will pass into the drying-tube. If air be admitted again through the drying-tube and its guard-tube, and the bomb once more exhausted, the last traces of moisture will be removed. It would decidedly deteriorate the apparatus to introduce a second valve in it. It would, in fact, be of immense advantage to abolish the present valve, as, however well made it may be, there is risk of leakage. The enamel which generally lines the interior of the bombs is hygroscopic, and may cause an error in the results. Only a platinum bomb would be entirely free from this and similar defects. But it would be very expensive; and for technical calorimetry the ordinary apparatus gives sufficiently accurate results. To test it, known quantities of water were introduced, and, by exhaustion and heating, transferred to the drying-tube, of which the access in weight was found. With 0·4800 gramme of water, the increase was 0·4796 gramme; with 0·5038 gramme, 0·5110 gramme; and with 0·4132 gramme, 0·4145 gramme. Such results are as exact as those of hydrogen determinations in ordinary organic analysis.

It may here be observed that considerable variations in results will be found unless the sampling is done with much care. From a large quantity of coal, an average sample weighing at least 11 lbs. should be taken. It should be weighed, and placed in a drying chamber; and when two consecutive weighings do not differ by more than 150 grains, the true decrease in weight is known, and corresponds to the natural moisture. The sample is then ground up finely, and portions taken from it for purposes of analysis.

THE MEASUREMENT OF HIGH TEMPERATURES.

The "Chemiker Zeitung" gives, through an Austrian source, a summary of an article by Wiborgh on "Pyrometers." Those depending on the difference in the coefficients of expansion of two metals, or of graphite and a metal, are really only of service up to 600° to 725° Fahr., as the structure of the metals then begins to change. Nitrogen-filled mercury thermometers cannot be used for temperatures above 900° Fahr. Air pyrometers extend to about 2500° Fahr., and are the most accurate but cannot readily be adapted for practical use. Calorimetric methods based upon cooling in a certain volume of water a definite weight of some substance of which the specific heat is known, are wanting in precision. Methods which depend on the temperature of fusion of certain substances are only reliable for high temperatures when silver, gold, and platinum are used, as alloys and other metals do not fuse at constant temperatures. Seger cones (see *ante*, p. 74) are only suitable for furnaces which are gradually raised to the temperature to be determined. The Siemens electrical pyrometer, which depends on the resistance of a platinum wire increasing with the temperature, has not proved satisfactory. The Le Chatelier platinum and platinum-rhodium thermo-couple is too sensitive to be of general practical utility. The optical pyrometer, which measures the temperature through the intensity of the light from incandescent bodies, permits of the determination of the highest temperatures without injury to the apparatus. M. Le Chatelier made the comparison of the intensity of the light with a standard light. The Mesuré-Nouel method, with two Nicol prisms and a quartz plate, is, however, the best. An incandescent body radiates light compounded of different colours; and according to the composition, the analyzer must be rotated through a certain angle. This angle corresponds to a particular temperature. Air and electrical pyrometers cannot be used above 2550° Fahr.; and therefore for higher temperatures either the Seger cones, metals melting at high temperatures, or the optical method, must be employed. For very high temperatures, the new method of pyrometry with "thermophones," to which reference was made in the "JOURNAL" for the 15th ult. (p. 498), is recommended.

The Profits on Incandescent Gas Lighting Abroad.—The report to be presented by the Managers of the Austrian Incandescent Share Company, Limited, at the second annual general meeting of the Company to-morrow, affords striking evidence of the great development which has taken place in incandescent gas lighting, and the consequent financial success of the companies identified with this system of illumination. The accounts accompanying the report show that, in the period from Oct. 16, 1895, to the 26th ult., there was realized a divisible credit balance of £83,825, out of which the payment of a dividend of 5s. per share (equivalent to 25 per cent.), free of income-tax, is recommended; carrying forward £3825. The profit is derived from the dividend paid to the Company by the Oesterreichische Gasgluhlicht Actiengesellschaft, the continued success of which is evidenced by the accounts. With a capital of about £125,000, there was a net profit of £221,700, after writing off £8200. The shareholders receive a first dividend of 5 per cent., and in addition, one of 125 per cent.; leaving a good balance to be carried forward. The dividend on the English Company's 775 shares (1000 fl. each), less exchange, comes to £83,495.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The Permanency of Illuminating Gas.

SIR,—The conditions relating to the deposit of naphthalene observed at the Old Kent Road works, and described in Mr. Browne's letter in your issue for the 29th ult., are perfectly consistent with the views expressed in my last letter and those contained in my paper on the above subject.

Illuminating gas produced from bituminous coal carbonized at high temperatures, and condensed in accordance with the approved modern practice of removing the tar as quickly as possible to prevent the absorption of the illuminants, also prevents the absorption of the naphthalene, and leaves the gas at the terminal of the condenser not only saturated therewith, but also holding in mechanical suspension condensed hydrocarbons, mostly naphthalene, in an extremely fine state of division. Owing to this extremely fine state of division and to their dry crystalline condition, these suspended matters are not easily removed; and they remain in considerable quantities in the gas after passing through the washing and scrubbing apparatus. Their presence in the gas leaving the scrubber is at once made evident on passing through it a ray of sunlight.

The gas entering the purifiers, therefore, is not only saturated with the vapour of naphthalene, but also holds condensed naphthalene in mechanical suspension. This suspended naphthalene is in part filtered out by the purifying material. But the rise in temperature due to chemical action raises the vapour tension of the naphthalene, just as Mr. Browne explains it raises the vapour tension of the water in the lime and purifier lutes; and both water and the finely-divided solid naphthalene are taken up in diffusion through the heated gas. The hot gas, thus highly charged with water and naphthalene vapour, must necessarily deposit both on again falling in temperature; and it altogether depends upon the circumstances under which the reduction of temperature takes place, where and under what conditions they are deposited.

Mr. Browne tells us that the precipitation of naphthalene in the meter connections precedes, and absorption of the previously deposited naphthalene follows, the replacement of the charges in the catch purifiers. These are exactly the conditions to be expected. The hot gas, highly charged with water and naphthalene vapour, on coming into contact with the cold newly-charged oxide, will become rapidly cooled; and the vapour tension of the water and naphthalene vapour being thus reduced, they are deposited, till the gas is left only saturated at the reduced temperature. The gas thus denuded of its water and naphthalene vapour, leaves the cold catch purifier, and enters the meter still warm after the deposition period. The gas becomes heated, and capable of again taking up water and naphthalene vapour in diffusion; and no doubt the gas takes up water vapour from the meter, as it also does, in diffusion, the naphthalene previously deposited.

The continued passage of the hot gas through the oxide, and the heat resulting from the condensation of the water and naphthalene vapours, gradually raise the temperature of the catch purifier; while the temperature of the meter falls, due to the passage of the cooled gas and the evaporation of the water and naphthalene vapours. The consequence is that less and less water and naphthalene vapour are precipitated in the catch purifier, and a proportionately less quantity of vapour taken up at the meter and its connections. Ultimately a balance of the vapour tensions in the respective parts of the apparatus is attained, when the conditions are as gradually reversed—the continued passage of hot gases from the lime purifiers heating up the contents of the catch purifier; thus not only allowing the vapours present in the gas to pass through it, but even causing the naphthalene deposit upon the oxide during the cold period to be revolatilized into the gas, and the gas thus highly charged with naphthalene and water vapour deposits them on their tension falling in passing through the meter and its connections. On the removal and replacement of a fresh charge in the catch purifier, the same sequence of conditions is repeated.

The effect of injecting hot hydrocarbon vapours among the gas highly charged with naphthalene at the terminal of the condensing process would result, in the first instance, in causing a larger quantity of naphthalene to be taken up in diffusion. But it would only be held temporarily in that state; for, on coming into contact with the large volume of cold water in the washers and scrubbers, it would be again deposited in the solid form, and in all probability in such a fine state of division as to cause a large quantity to be carried forward into the purifiers, and intensify the conditions which have just been described. It appears to me the increased enrichment obtained by Mr. Browne was probably due to this cause.

The phenomena observed at the Old Kent Road works are thus shown to be in perfect accordance with the well-ascertained laws relating to the tension of vapours and their diffusion through gases; and I have no doubt many other of the anomalous troubles arising from the deposits of naphthalene are due to similar conditions occurring in the subsequent storage and distributing plant.

It is a well-ascertained fact that troubles arising from naphthalene deposits are much more numerous in the late autumn and early winter months than during the rest of the year. Why should they be so? Surely not because a larger volume of naphthalene is being then produced, nor on account of the greater friction, nor yet because of the greater condensation of water vapour. The explanation appears to me to lie in the temperature conditions obtaining in the various parts of the plant at the different periods influencing the vapour tension of the naphthalene present in the gas, leading to its ultimate condensation and volatilization, dependent upon the saturation-point of the gas with naphthalene at the temperature to which it is exposed.

During the late winter and early spring months, the condensing and scrubbing plant, and also the storage holders, have become cooled during the early months of winter, and are exposed to temperatures lower than the buried mains and services, and as low as even the part which is not covered. The tension of the naphthalene present in the gas being thus reduced in the manufacturing and storage plant, it is deposited to a large extent upon the works or in the gasholders; and

it is only the naphthalene which has been carried forward in an extremely fine state of division, and which becomes volatilized into the gas in the warmer mains, that can possibly give trouble by being subsequently deposited in the colder exposed parts of the distributing plant.

During the late spring and summer and early autumn months, the temperature of the condensing and scrubbing plant and storage holders gradually rises; raising the vapour tension of the naphthalene, and allowing a larger volume to diffuse through the gas. The great mass of water in the holder, however, owing to its high specific heat, and the deeper buried trunk mains, takes time to attain to a like temperature; and for a while precipitation of the naphthalene takes place at these points. But by the end of summer a fair balance of temperatures between the various parts of the condensing and distributing apparatus is attained; and consequently the minimum of trouble from naphthalene deposits is then experienced.

During the late autumn and early winter months, the temperature conditions of the different parts of the plant are much modified. The temperature of the air falling, the exposed manufacturing plant is reduced in temperature; lowering the vapour tension of naphthalene present in the crude gas, and leading to its greater precipitation in the plant. But the denuded gas, subsequently coming into contact with the not yet cooled, but comparatively warm, water in the holder and buried mains, becomes heated, and in a condition to again take up naphthalene in diffusion. This it does, either from that in mechanical suspension in the gas, or from that previously deposited in the holder and trunk mains. The naphthalene so taken up in diffusion is carried forward in the gas till it meets with the colder surface of some part of the mains or services exposed to the lower surface temperature of the air, when the vapour tension of the naphthalene is again reduced, and it is precipitated in the crystalline form. These conditions are frequently much intensified by the very high day and low night temperatures at this season of the year.

It is quite true I agreed with Mr. Browne that enrichment leads to reduced deposits of naphthalene. But I qualified the statement by explaining that different methods of enrichment had different effects in this respect; that enrichment by cannel had the double effect of absorbing the naphthalene from the gas during the process of condensation, and thereafter holding the remaining naphthalene in diffusion by the increased volume of enriching gas; and that, by the Maxim-Clark process, the only effect in preventing naphthalene deposit was confined to the latter cause. I was quite aware of the small volume of carburine vapour required by the London Companies to raise their gas to the desired illuminating power; and I was also aware that it had a similarly small effect in preventing naphthalene deposit. When I summed up the conditions necessary to prevent naphthalene deposits by the Maxim-Clark process, I had no desire to advise any company to adopt such a method of getting quit of the trouble with naphthalene, far less the South London Companies.

Mr. Browne states that aqueous vapour present in the gas leaving the lime purifier is precipitated as a finely-divided mist or fog on the gas being cooled. If water is thus precipitated, I cannot see any reason why the naphthalene similarly diffused through gas should not be similarly deposited as a mist; and assuming that it can be so deposited, I would ascribe the reason why naphthalene is more liable to accumulate in bends and tees, to the fact that naphthalene not only deposits more rapidly at these points in the crystalline form, owing to the gas being brought more intimately into contact with the cold surface, but also to the impacting of the mechanically suspended naphthalene present in the gas among the depositing crystals.

WM. YOUNG.

Peebles, Oct. 2, 1896.

The Self-Enrichment of Coal Gas.

SIR,—In your issue of the 29th ult. appears a letter from Mr. J. Martin, of Ormskirk, anent the above, which is calculated to mislead, and, in consequence, requires some little explanation.

It is quite true that, at the time stated, Mr. Broadhead called at Ormskirk, and, in the course of conversation, incidentally mentioned the experiments then in progress at Low Moor, to which Mr. Martin replied that he was returning purified gas from the gasholder—obtaining thereby an increased illuminating power. From his letter, one would infer that, in consequence of this conversation, we had appropriated his idea. This is a great mistake. Almost twelve months prior to that date, we were at Low Moor making preparations to put to the test an idea similar to that claimed by Mr. Martin, which, however, proved a practical failure. But, as described in my paper read before the Eastern Counties Gas Managers' Association at Retford last month, further experiments resulted in a more successful issue, and led to our applying for, and obtaining, provisional patent protection in June, 1895, three months before the conversation mentioned took place. This protection was renewed in March, 1896, and the full patent obtained the following August.

Respecting the method itself as patented, a full, and I think fairly intelligible, description of it is to be found in the above-mentioned paper, a perusal of which, along with the patent specification, will disclose the radical difference between returning holder gas and the method of gas enrichment as patented by Mr. Broadhead and myself.

R. G. SHADBOLT.

Grantham, Oct. 2, 1896.

Gas Cookers and Coin Meters.

SIR,—In reply to the inquiry of "A Corporation Gas Manager" in last Tuesday's "JOURNAL," I may say the Board I serve decided, in the summer of 1894, to supply prepayment meters and fittings to cottage houses, intending to defray the cost out of revenue. But the applications were so numerous that it was soon apparent that the amount to be expended would be greater than should be borne by one or even two years' income. They therefore applied to the Local Government Board for sanction to a loan of £1000 repayable in five years. A public inquiry was held by one of their Inspectors, and both sanction and loan obtained before the close of that financial year. The Corporation your correspondent represents might experience some difficulty in obtaining sanction for a loan to replace money already spent.

CLERK.

Oct. 3, 1896.

LEGAL INTELLIGENCE.

COUNTY OF LONDON ASSESSMENT SESSIONS.

Sessions House, Clerkenwell, E.C.—Thursday, Oct. 1.

(*Before Mr.* LOVELAND-LOVELAND *and a Bench of Magistrates.*)

Wandsworth and Putney Gas Company v. Wandsworth and Clapham Union.

The hearing of the appeals from the last quinquennial assessment of the Metropolis commenced to-day; the above-named case being taken first.

Mr. BALFOUR BROWNE, Q.C., and Mr. RYDE appeared for the Company; Mr. MARSHALL, Q.C., Mr. GRAHAM, and Mr. ELLIOTT represented the Union.

Mr. BALFOUR BROWNE, in opening the case, said there were three parishes—Putney, Wandsworth, and St. Mary, Battersea—in which the works of the Company were to be found. The rating authorities had made very large increases. In Putney, the gas-mains and pipes were originally put at a gross value of £1566, and the rateable value at £1305. The old assessment was only £870; so that there was an increase of £435. The Company appealed to the Assessment Committee, who raised the rateable value to £1820. In Wandsworth, the main and service pipes were originally put at a gross value of £5877, and a rateable value of £3918. To the latter amount, should be added £4306, the agreed figure for the works, which were in the parish. That made the rateable value for the Wandsworth part of the undertaking £8224, against the old rateable value of £5000. In St. Mary, Battersea, the gross value was originally put at £855, and the rateable at £570, which was an increase of £440 on the old rateable value of £130. The old assessments were fixed at the last quinquennial by compromise. In the present case, the Company went before the Assessment Committee; and in certain instances they obtained a slight reduction. In Wandsworth, the figures for the mains and pipes were now put at £5040 gross, and £3360 rateable. The Company alleged that the latter figure should be £1293. In Putney, the new figures were £2184 gross, and £1820 rateable; and his case was that the latter figure should be £753. In St. Mary, Battersea, the gross was now £564, and the rateable £369; and the Company said the last-named amount should be £146. Altogether there had been the very large increase of £3853 on the rateable value. The Company admitted that there should be an increase on the whole undertaking; but they put it at £498 only. Taking the whole together, according to the parishes the gross was £14,237, and the rateable £9855; but according to the Company, the rateable should be only £6498. The old rateable value being £6000, the parishes were proposing an increase of 64·25 per cent.; and as the dividend had only increased by 12 per cent., one suspected that there was something wrong in the figures. He thought the case would resolve itself into two main points. The year 1894—which was the one taken here—was in many respects abnormal, owing to a very rapid increase in the price of residual products. The earnings in that particular year worked out to the large figure of £18,196. Under the sliding-scale which now governed the Company, £14,025 was distributed as dividend; and his case was that this £14,025 was the amount that any tenant would calculate upon for the payment of rent. The remaining £4171 was carried forward as an undistributed balance; and he contended that any prudent tenant would have done the same. He thought it would be found that the parishes had started by taking the total earnings, instead of the amount distributed. The next point of difference would probably be the question of the tenant's share. The Company had taken five average months' expenses; and their case was that any tenant would require to have this amount in hand against the outstanding rent. Mr. William Marshall had estimated that a tenant would require for working capital £41,358; and 17½ per cent. on this would be £7238. To this he added the payment of 5 per cent. on consumers' deposits (which amounted to £9581, and was a diminishing amount, but which was used as capital); and this brought out £7731 as his allowance for tenants' capital. This amount deducted from £16,439—the sum appropriated by the Company for the year ending June 30, 1895, and rates—gave the rateable value of the whole undertaking, *plus* rates, as £8708. Deducting from this the rateable value of the station works (which was an agreed figure) and the rates thereon, brought out £2931 as the rateable value of the gas mains and pipes, *plus* rates, according to the contention of the Company.

Mr. *William Marshall*, in reply to Mr. RYDE, said he had valued the whole of the appellants' property for the last three quinquennial assessments. In 1894 he found that the Company had statutory power to appropriate £14,025; but inasmuch as the Court took the accounts to June, 1890, on the last occasion, he thought it proper to increase this amount to £14,283, by going down to June, 1895. The rates actually paid were £2156; and they averaged 6s. 10d. in the pound. This made the total amount divisible between owner and occupier, *plus* rates, £16,439. The amount of working capital required was £41,358, exclusive of consumers' deposits. The gross receipts in 1894 were £75,061; and the total expenditure, £56,879. From the last figure he deducted £18,327 for repairs and maintenance of works chargeable to the landlord, rates and taxes, and parliamentary expenses. Then he deducted £4315 for coal carbonized and law expenses, which made the total tenants' working expenses £42,867. The tenant could not work the undertaking properly without five average months' expenses in hand. These expenses would represent £17,861. Then a tenant would have to pay six months' rates (£1250), which would bring the figure to £19,111. From this he deducted £14,411 for receipts from residual products and for deposits from consumers, which left £4700 as the amount of cash which the tenant would certainly have to provide to meet his liabilities. There would also have to be a fixed cash balance at the bank to meet contingencies, which he put at £2500; and this added to the £4700, made £7200 as the cash required by the statutory tenant in order to

properly work the undertaking. The total value of stores which a hypothetical tenant would require to have on hand he estimated at £7383. Then there was the moveable plant on the works. In accordance with a decision of Sir Peter Edlin in the East and West India Dock case, at the previous quinquennial assessment, he included the travelling cranes as tenant's capital; and for these, together with the drawing and charging machines in the retort-houses, he allowed £4300. The value of meters he put at £10,170; cooking-stoves, £7093; heating-stoves, £2677; furniture, loose plant, utensils, tools, &c., £2535. All these items together brought out £41,358 as the tenant's working capital; and he allowed 17½ per cent. on this as the tenant's share of the profits of the undertaking. This 17½ per cent., added to the 5 per cent. paid on consumers' deposits, came to £7731, which, deducted from the £16,439 (the total amount that could be appropriated), left as the rateable value of the whole undertaking, *plus* rates, £8708. Then deducting from the latter figure £4306, the agreed rateable value of the works, and £1471 for rates thereon, brought out £2931 as the rateable value of the mains and pipes, *plus* rates, according to his judgment.

Cross-examined by Mr. MARSHALL: He had taken the receipts to June, 1895; but he had adopted the expenditure for 1894. He considered that in the case of a strike the tenant would charge the abnormal expenditure caused thereby to the insurance and renewal fund. In 1889, the year taken for the last assessment, there occurred the great strike; and he believed it was asserted then that a lower valuation was made, because of the strike. The Company compromised the case then; but he thought the figures they accepted were too high. An incoming tenant would have nothing to do with the reserve fund—that, in his opinion, was a landlord's fund.

Mr. MARSHALL: The Act says that the reserve fund may be drawn upon for dividend. In this case, over £4000 was carried to the reserve fund, which constituted a guarantee *pro tanto* of the dividend. This being so, why should you allow so much as 17½ per cent.?

Witness: The 17½ per cent. includes only 2½ per cent. for risk; and I think nowadays that is not sufficient. More ought to be allowed, to provide for the fearful risks gas companies have to meet in the way of coal strikes and other labour disputes, and, in the case of this Company, in the shape of a frozen river, which is a real risk here.

In reply to further questions, witness said he had stated before the Assessment Committee that he fixed the tenant's working capital at £36,500. He had since found that various items had been left out of the calculation—such, for instance, as fitting and fixing the stoves. A tenant coming in in January would not require any capital; but one taking possession at Michaelmas would need capital to carry him over to January. He always assumed that a tenant came in at Michaelmas; and then ascertained what such a tenant would require to take him through the worst period of the year. He based his opinion that five average months' expenses should be taken upon a rule-of-three sum, which showed that the amount of coal carbonized during the worst four months of the year was equal to 24 average weeks' consumption.

By Mr. GRAHAM: In 1890, the rateable value, apart from the works, was £2600; and his total was now about the same. But then the rating of the works had been considerably increased. It was true the net receipts had increased from £11,896 in 1889 to £18,196 in 1894.

Mr. *H. E. Jones*, M.Inst.C.E., in reply to Mr. BALFOUR BROWNE, said he was Deputy-Chairman of the appellant Company, and had formerly been the Engineer. The works of the Company had been very cheaply constructed. The Company's dividend only took 8d. per 1000 cubic feet of gas; whereas when at the last quinquennial he was a witness for The Gaslight and Coke Company, he had to give evidence of a dividend of 14½d. per 1000 feet. The net profit of £18,196 in 1894 was an unusual amount; and no prudent man would build upon it. As a matter of fact, the profits dropped the next year to £14,528. A prudent man would only expect to get £14,500 a year for the undertaking. He estimated that the total working capital required by a tenant would be £51,922. The difference between his estimate and Mr. Marshall's was accounted for by the fact that he included £9851 of consumers' deposits, and Mr. Marshall did not. He allowed 17½ per cent. on the £51,922, or £9086; and deducting this from the net income of the undertaking (£14,500), *plus* £2273 paid for rates and taxes in 1894, there was a rateable value, *plus* rates, left of £7687. From the latter figure he deducted £1957 for rates at 6s. 10d. in the pound, which left £5730 as the rateable value of the undertaking, including the works, for which there was an agreed figure of £4306.

By Mr. MARSHALL: He had made out his figures on the accounts for 1895.

The CHAIRMAN: Then we may put them aside, unless Mr. Jones brings an amended statement to-morrow.

Friday, Oct. 2.

On the resumption of the proceedings this morning,

Mr. *Jones*, recalled, said that since yesterday he had gone into the figures for 1894. Starting with the net income that he took yesterday —£14,500—he now brought out that the total working capital which a tenant would require would be £51,239; 17½ per cent. on which would be £8966. Deducting the latter amount from the net income (£14,500), *plus* the rates and taxes paid in 1894 (£2273), left a balance of £7807; and deducting rates at 6s. 10d. in the pound from this balance, £5819 was left as the total rateable value of the entire undertaking, as against £5730 the amount he brought out yesterday on the figures for 1895. He had followed the same principles in dealing with both sets of figures.

The CHAIRMAN: I make it that Mr. Marshall's valuation of mains and pipes, less works and less rates, comes to £2192. Is that so?

Mr. *W. Marshall:* Yes; that is quite correct.

The CHAIRMAN: Mr. Jones's figure of £5819, after deducting the agreed £4306 for the works, comes out to £1513?

Mr. *Jones:* Yes. The difference lies in the £10,000, consumers' deposits——

The CHAIRMAN: I know the details; you need not go into that.

Mr. *Corbet Woodall*, M.Inst.C.E., in reply to Mr. BALFOUR BROWNE, said that as Mr. W. Marshall had made out his valuation on the figures of 1894, he (Mr. Woodall) had adopted the same course; though he considered that the best way to find out what a hypothetical tenant could properly expect in 1894, was to look at 1895, because then reasonable expectation had been either verified or refuted by fact.

The CHAIRMAN: I see from the papers handed to the Court, that Mr. Woodall puts the gross receipts at £53,000, whereas Mr. Marshall put them at £75,000. What is the explanation of the difference?

Mr. BALFOUR BROWNE: Mr. Marshall's estimate includes £18,000 for residuals; but witness deducts that from the price of coal before arriving at the receipts.

The CHAIRMAN: Deducting that, makes £58,000, as against £75,000. There is still a difference of about £4000.

Mr. BALFOUR BROWNE: Mr. Marshall, in his revenue account, gives the receipts from the sale of gas as £56,000; the difference between this amount and Mr. Woodall's £53,000, is owing to the fact that Mr. Woodall has taken into account the reduction in the price of gas which took place in 1895.

Witness: Because the tenant would know that the price was decreased, and would not expect in the following year to get £56,000. There would be a larger consumption in 1895, in consequence of the reduction in price; but he had been unable to bring in the figures for that year. Had he been free to do so, the result of taking them as a whole would have been worse for the parishes. The proper allowance for the tenant's working capital he put at £50,000; and then, with a few exceptions, he had taken Mr. Marshall's figures. In regard to the consumers' deposits, they were subject to be recalled at almost a moment's notice; and therefore it could not be assumed that the tenant could make use of the whole amount. He thought half of it ought to be ready at call. Then Mr. Marshall deducted 25 per cent. from the value of the meters. He had a very strong feeling that this deduction was too great; and he had therefore only taken off 15 per cent. Mr. Marshall allowed £2500 as a fixed balance at the bank for contingencies; but he had allowed £5000, as he had found that from June, 1894, to December, 1895, there had always been in the bank and on deposit more than that. He allowed the usual 17½ per cent. on the £50,000 he put as tenants' working capital. This percentage came to £8750; and deducting it from £24,024, which he put as the net receipts, he found a gross estimated rental of £15,274, from which he made a further deduction of £9059 for repairs and renewals. This finally brought out the rateable value of the entire undertaking at £6215.

The CHAIRMAN: Deducting the £4306 for the works, that leaves £1909 to compare with Mr. Jones's £1513 and Mr. Marshall's £2192.

Cross-examined by Mr. MARSHALL: The price of gas in 1894 was too high; and the hypothetical tenant in 1895 would have reduced it, as the Company did—the price being governed by the amount he could appropriate. The actual cash which he had found at the bankers' would, no doubt, include some of the consumers' deposits.

Mr. *H. Freeman*, the Engineer and General Manager of the Company, in reply to Mr. BALFOUR BROWNE, said he had supplied Mr. W. Marshall with his figures in reference to stoves, meters, and stores. A tenant acquiring the undertaking would undoubtedly have to provide capital for working during the heavy winter months, and not during the summer months. Mr. Marshall's allowance of 5-12ths of the expenses was not too much for tenant's capital. New meters supplied to fresh customers were charged to capital, but all repairs to, and depreciation of, meters were charged to revenue. The year 1894 was an exceptional one, owing to a reduction in the price of coal and heavy returns from the residual products; and no prudent tenant would calculate upon a continuation of these conditions. In order, therefore, to arrive at what would be earned in the years following 1894, considerable corrections would have to be made in the accounts for 1894. The price of sulphate of ammonia, for instance, had fallen very largely. In 1894, the Company earned more than they could divide, and so £4000 was carried over as an undistributed balance. But for this money, they could not have paid a dividend in 1895. About £1400 of the £4000 was carried forward to the insurance fund. There was a strike clause in their coal contract. It was always the practice to pay for the coal monthly. They were paying more for coals than in 1894, when residuals were very high.

Cross-examined by Mr. GRAHAM: They sold 11 or 12 per cent. more gas in 1895 than in 1894; and, notwithstanding the fall in residuals, the gross receipts in 1895 were under £1000 less than in 1894.

By Mr. BALFOUR BROWNE: The consumers' deposits, which at one period amounted to £9851 8s., had been reduced, and now stood at about £5000.

Mr. MARSHALL then addressed the Court on behalf of the parish of St. Mary, Battersea. He said that, although the Assessment Committee had reduced the rateable value in St. Mary's from £557 to £369, the Company had appealed, notwithstanding their accounts showed a large increase of business since the last quinquennial assessment, resulting in a considerable gain to the Company; the profits in 1889 being £11,896, and in 1894 £18,196. The addition proposed by the parish was very reasonable indeed; and ought to have been very much greater. The statement was now made that 1894 was an exceptional year, owing to the high price of residuals; but it should be remembered that the settlement made in 1890 was a low one, in consequence of the great strike of 1889, and was misleading and fallacious, because it was not based on an average of what had taken place before and of what might take place afterwards. He contended that it was impossible to deduct the £4000, and to take into account only the £14,025 paid as dividend in 1894, as the Company's valuers had done. They must look at the whole matter. It was all very well to say that 1894 was an abnormal year; but the year preceding the valuation had been laid down as the account year, and it was not open to any Court to ramble up and down five or ten years. The amount divisible in 1894 was £14,025. To this ought to be added £1428 (the amount paid into the insurance fund that year), and the rates £2156, added by Mr. W. Marshall; and these items brought the Company's initial figure to £17,609, as against the gross receipts of £18,196, which he contended should be taken. The 17½ per cent. on tenant's capital was very large. It included 2½ per cent. for risks, which the insurance fund was created by statute specially to meet; the section expressly referring to accidents, strikes, and other circumstances of a similar kind. Though Mr. Marshall charged this 2½ per

cent., he did not bring the insurance fund into his estimate. If the fund had been included, there would have been very little difference between the initial figure taken by the different valuers. His valuers brought out the working expenses at about £37,000, as against Mr. Marshall's £42,867; and while the Company claimed for five months working expenses, his valuers allowed four months.

The CHAIRMAN: We should be very glad if you would agree upon the tenant's capital. Our present opinion is that this capital, as proved by the various expert witnesses for the Company, is too high.

Mr. MARSHALL (continuing) said that whatever was settled about the working expenses, the money received for residuals for the whole year ought first to be taken off it, because the money was coming in all the time. In fact, what the Court had to inquire into was what amount of money was actually coming in, and what amount actually going out. The treatment of consumers' deposits was a very debateable question; and his valuers had not taken them off at all. As regarded the fixed balance at the bank, which Mr. Marshall had put at £2500, he contended that as month by month money was coming in which covered the money that was going out, even if the Court should think that a small floating balance was necessary, that balance would be found to be very small indeed. His valuers differed from Mr. Marshall as to the estimated value of meters and stoves; and in regard to moveable plant, according to the Tyne Boiler case and the Bishopwearmouth case, the steam travelling cranes should be assessed upon the freehold. Then the 17½ per cent. was too large.

The CHAIRMAN: I do not think we could depart from the usual custom, unless you can show us very strongly that it is wrong.

Mr. MARSHALL: In the Gaslight and Coke Company's case, Sir Peter Edlin said the 17½ per cent. was not regarded as an immutable and hard-and-fast line.

The CHAIRMAN: And now Mr. W. Marshall says the time has arrived to change it, because 17½ per cent. is not enough. On the question of the bare 17½ per cent., we think, as far as we have heard, that we should follow the old rule. Taking into consideration strikes and other casualties, it is not too much. Strikes do not occur very often; but when they do, they paralyse business for some considerable time.

Mr. MARSHALL, in conclusion, said that his witness (Mr. Hedley) would show that the rateable value of the productive mains, *plus* rates, was £11,408, which equalled 20 per cent. of the gas and meter rentals. If this valuation was correct, it would doubly justify the Assessment Committee, because they had only taken 10 per cent. of the gas and meter rentals.

Mr. *R. W. Hedley*, in reply to Mr. GRAHAM, said he took the actual gross receipts at £74,989, and the working expenditure at £37,326; the details of the latter being obtained from the published accounts. This gave a balance of £37,663 as gross earnings. The tenant's capital he put at £29,817. To arrive at this figure, he took the expenditure, added the rates, and then deducted the residuals. This gave £22,927, one-third of which, or four months' working expenses, was £7642. Then he added £4072 for coals, £13,248 for meters and stoves, 1s. per ton of coal carbonized for tools, and other items. On the £29,817 so made up, he allowed 15 per cent. or £4471. To this he added Directors' fees, £1194, which brought out £5665 as the tenant's allowance. This deducted from the gross earnings, £37,663, made the gross rental £31,998; and from it he deducted £14,885 for repairs, maintenance, and renewal—leaving £17,113 as the rateable value of the entire undertaking *plus* rates. Then deducting the agreed figure for works and unproductive mains *plus* rates, the rateable value of productive mains, *plus* rates, was shown as £11,408. He had taken eight years' stove and meter rent to represent the value of the meters and stoves. Mr. Marshall, in putting down nearly £20,000 for them, had taken a very large sum. Four months' working expenses was an ample allowance. Assuming a tenant had no balance at his bank, during the first four months of the year he would be overdrawn; but during May this would be entirely cleared off, and for the rest of the year he would pay his way. His (witness's) valuation of the mains and pipes, less rates, was £8553; whereas the amount which the parishes were claiming was £5549.

Cross-examined by Mr. BALFOUR BROWNE: The difference between his £37,000 and Mr. Marshall's £42,000 for working expenditure, could be accounted for by witness having brought in repairs and maintenance of works lower down in the account. In consequence of Mr. Marshall's statements before the Assessment Committee, and in order to avoid litigation, he had advised the Committee to bring the assessment down to a much lower sum than his own estimate. He had allowed £7642 in cash to the tenant, as against Mr. Marshall's £7200, notwithstanding that the latter based his calculation on five months' expenses, and witness allowed only four months. He had applied to Mr. Marshall for information respecting the meters and stoves; but not having been supplied with any, he followed his usual course and allowed eight years' purchase of them.

Mr. *C. Barker*, in reply to Mr. MARSHALL, said he took the gross receipts at £74,988 and the working expenses at £37,426, which left a balance of gross profits of £37,562. Adding the rates to the working expenses, and deducting the residuals, left a balance of £23,027, of which he allowed the tenant one-third, or four months' expenses—namely, £7675. Then for coals, tools, &c., he allowed the same figures as Mr. Hedley, but put down £16,560 for meters and stoves. These items, together with the four months' expenses, totalled up to £33,162, on which he allowed 15 per cent., or £4974; and adding £1200 as Directors' fees, that brought out £6174 as the tenant's share. Deducting this figure, the agreed amount for the works and the rates thereon, and £15,953 for the statutable deductions, from the gross profits of £37,562, brought out the rateable value of the mains, *plus* rates, at £9623. He had taken ten years' rent of the meters and stoves, instead of the eight years adopted by Mr. Hedley. He fixed that last night after discussing the matter with Mr. Hedley. The repairs in 1894 seemed to be very high indeed; and he thought there must be a large quantity of structural work in them.

Cross-examined by Mr. BALFOUR BROWNE: Previous to last night, he had put down the meters and stoves at £13,000. He had taken out everything that had to do with maintenance and repairs, and charged it to the landlord.

The CHAIRMAN: Perhaps before to-morrow morning, the parties might take the hint thrown out by the Court, and agree on some of the figures. At present, we think the Company ought not to have both the unappropriated balance and the 17½ per cent.; and the tenant's capital, as proved by the Company, is to our minds too much.

Mr. BALFOUR BROWNE: We will do what we can.

Saturday, Oct. 3.

At the opening of the Court this morning,

Mr. BALFOUR BROWNE stated that a settlement had been arrived at between the valuers, the terms of which his learned friend Mr. Marshall would state. He hoped it would not go out that the Court had decided that they were prepared to take the earnings of 1894. Of course, it did not really matter now to his learned friends in this particular case; but he held a very strong view that the earnings were not the guide.

The CHAIRMAN: You intimated last night that we should keep our minds open until we heard your argument.

Mr. BALFOUR BROWNE: Quite so. All I want to guard against is that your indication of yesterday may not be quoted. I hope to be able convince you that on that we were right.

The CHAIRMAN: We shall hope some other day to hear that argument from you.

Mr. MARSHALL said the total gross rateable value of the pipes and mains had been settled by the valuers at £5999, and the total net rateable value at £4000. The apportionment between the parishes would be as follows:—

	Gross.		Net.
Wandsworth	£3547	..	£2365
St. Mary, Battersea . .	393	..	262
Putney	2059	..	1373
	£5999	..	£4000

Mr. BALFOUR BROWNE: I presume judgment will be for these figures, as agreed between the parties?

The CHAIRMAN: Yes; the parties to pay their own costs.

The New River Company's Appeal Withdrawn.

The appeal which the New River Company had entered against the assessment of their property in the parish of St. Mary, Stoke Newington, has been withdrawn, a compromise having been agreed to. The assessment was placed by the authorities at £16,566 net rateable value; and it has now been reduced to £16,300.

Embezzlement by a Collector.

At the Lambeth Police Court, last Wednesday, William Wilson Irving, 38, described as a gas collector, of Sidmouth Grove, Peckham, was charged on remand with embezzling money belonging to his employers, the South Metropolitan Gas Company. Mr. Passmore prosecuted; Mr. W. H. Armstrong defended. The prisoner entered the service of the Company sixteen years ago; and about two years since, he was appointed as collector—his duty being to collect the money from automatic meters, and to account to the officials for the amounts received. It was alleged that he had failed to do this in respect of sums amounting in the aggregate to between £30 and £40. Mr. Hopkins sentenced him to two months' hard labour.

Waste of Water by a Mischievous Boy.

At the North London Police Court, a few days ago, Arthur Bevan, a boy of twelve, was summoned before Mr. Paul Taylor for wilfully wasting water of the East London Water Company. Mr. G. Kebbell, Solicitor to the Company, who prosecuted, said the defendant was charged with disconnecting a stand-pipe which had been erected in Cassland Road, Hackney, during the recent drought for the supply of the inhabitants. He (Mr. Kebbell) was sorry to bring this little boy before the Court; but he was compelled to do so, because this was but one of a series of such mischievous acts by boys. Under section 60 of the Water-Works Clauses Act, 1847, any person who wilfully disconnected pipes was subject to a penalty not exceeding £5 for each offence. Witnesses would tell the Court that the defendant deliberately unscrewed the connection, as a consequence of which about 2000 gallons of water were wasted. The water rose to a considerable height, and made its way into the adjacent houses, and did a great deal of damage. Perhaps his Worship would adjourn the case, if the boy's father would undertake to give the defendant a thrashing. The father replied that he did not want to do this, as his son was delicate. Mr. Taylor said he did not look so. He added, moreover, that it was a very sensible suggestion on the part of Mr. Kebbell. It was certainly a very mischievous act. The defendant said he was trying to screw up the connection when it came off; and he called a witness to confirm this. But Mr. Taylor said he did not believe it. Unless punishment was inflicted in such cases, it was of no use giving them publicity. He would adjourn the matter for two weeks, to enable the father to thrash the boy in the presence of one of the officials of the Company.

Spalding Water Company.—The annual meeting of this Company was held last Wednesday, under the chairmanship of Alderman Mills. The Directors' report stated that the balance on revenue account was £946; and after paying a dividend of 6 per cent., which would absorb £780, it was proposed to add £100 to the reserve fund. The report also stated that the Company had proceeded with the erection of a pumping-station at Bourne; and the Board believed that, when the present works were completed, all difficulty of obtaining an ample supply of water would be overcome. Moving the adoption of the report, the Chairman mentioned that negotiations had been commenced by the South Lincolnshire Fen Water Company for the purchase of the undertaking. But up to the present nothing had transpired therefrom; and the parliamentary powers of the Fen Company would shortly expire. The report was adopted.

MISCELLANEOUS NEWS.

COMMERCIAL GAS COMPANY.

The Ordinary Meeting of this Company was held last Thursday, at the Cannon Street Hotel, E.C.—Mr. J. BLACKET GILL in the chair.

The SECRETARY (Mr. H. D. Ellis) read the notice convening the meeting; and the report of the Directors, given in the "JOURNAL" last week, was taken as read.

The CHAIRMAN, in proposing the adoption of the report and accounts, observed that people had lately read a good deal about the great improvement in trade, and that commerce was once more flourishing among them. He was sorry to say, however, that these improvements had not found their way down to the East of London. There, as usual, poverty abounded, and enterprise was not known. Large trades which were once flourishing, and in which numbers of men were employed, had long since ceased to exist; and this, together with many other reasons, caused him that day to lay before them figures which were not altogether satisfactory. The happy time had passed, he supposed, when they used to advance "by leaps and bounds" to prosperity. Now their progress was of a more jog-trot description; for if they found that in one branch of their trade they were successful, they suffered uncomfortable reverses in another. This year they had been favoured with cheap coals, and in their district there was little or no electricity. But, with all their efforts, they could only just about manage to make their gas and meter rental the same as at that time last year, while their residuals had landed them in a great loss. He ventured to refer at their last meeting to the policy which was pursued by their big neighbour of accumulating large stocks, as probably accounting for the loss they had suffered by coke and sulphate of ammonia. Under these circumstances, they had not earned their statutory dividend. This was a disagreeable feature; and he was sorry for it. But the fact was that shareholders in gas companies had for some years past been so accustomed to these handsome dividends, that he supposed, so long as there was anything left out of which a dividend was to be paid, they would feel themselves aggrieved if they did not receive the statutory amount. Reserves, like riches, sometimes flew away, and were no more seen; and his own impression was that the time had passed when, from the state of their district generally, they could ever hope to accumulate the large reserves they were fortunate enough to obtain in the past. However, there was their very big neighbour, who had not made both ends meet, and who had had to draw considerably upon his reserves; though the South Metropolitan Gas Company, more fortunate, had shown something to the good. Perhaps the most interesting feature, as it had been for some months past, was the constant and steady increase in their coin-meter system. They could not hope to extend this at the enormously rapid pace of their friend Mr. Livesey; but this year they had placed 4187 coin-meters out in their district—showing an increase of 1462 since their last meeting. On this point, he might say that a leading broker in the oil market had informed him that these meters were making a very large difference in the sale of petroleum. Probably he and those present were very pleased to hear this, more especially as the oil trade was in the hands of one gigantic monopoly, who did not hesitate to cause them to be charged a very large price for their oil for enriching purposes—a proceeding which had led them to take to cannel, or partially to do so. They had 5698 stoves out; being an increase of 533. They were compelled to employ special collectors for their coin-meters; but besides collecting the money from these meters, they endeavoured to obtain fresh customers for the Company. With regard to their accounts, coal had cost them £4346 less; repairs and renewals of meters, £700 more; and rates showed an increase of £784, which was something like 10 per cent. This item represented 1·63d. per 1000 cubic feet of gas sold. Their local indebtedness seemed to be going on wildly. Though they did their utmost to check the increase in their rates—and no Company could be served better in this respect than they were by their Engineer—still their rates increased very much more than they liked to see. He was glad to say that their bad debts had been £242 less, which was very satisfactory; showing that the collectors had done their work well. Their rental for gas was £598 less, but from meters they had had £422 more; and therefore there was a very slight difference in these items taken together, comparing the past half year with the corresponding period of the previous year. With reference to residual products, they had obtained £7178 less from coke and breeze, £942 less from sulphate of ammonia, and £246 less from tar—making a total reduction of £8406. As he had told them before, these items were beyond their control. They did the best they could; and they had no large stock of sulphate on hand. He had been rather depressed by reading in the "JOURNAL OF GAS LIGHTING" the other day that the brokers had almost given up the hope of seeing sulphate rise any more. As they wanted £50,050 to pay their full dividend, and they had only £43,249, it followed that they were £6801 short. This they proposed to take from their undivided profits, and carry forward £8314. They recommended the payment of the usual dividends of 13½ per cent. per annum on the old stock and 10½ per cent. per annum on the new; £3 5s. a forfeiture for defective power; and to carry £890 to the reserve—being the ½ per cent. which the proprietors were entitled to receive. They had spent a great deal of money on new works. At Wapping, they had built a new retort-house with regenerative furnaces and labour-saving appliances; and at Stepney, where they had put up a new gantry, they were employing labour-saving machinery to unload the barges—thus doing away with some of the coal-whippers. This made them more independent; and they were very glad to do all they could in this direction. At Poplar, they had a tramway for coke, with a little engine to work it; and he hoped that before long they would have their steamer running regularly to Poplar. At the present time, the coals were discharged on the Regent's Canal, and were brought up by barges. When they had their own steamer running alongside their works, they would save very considerably, and get their coals in better condition. They would notice that they were overdrawn by £11,594 on capital account. This was easily accounted for by the works he had mentioned, and by their considerable expenditure on coin-meters. As time went on, they would have some of this money returned in the case of the coin-meters; and there was no doubt that this system would be a most valuable adjunct to their business. He might say that with the Money Market in such a peculiar condition as it had been in for many months past—money being almost a drug—they had not thought it wise or right to call up capital until they were absolutely compelled to do it; and he need not say that if they should think of doing so at any time, the proprietors would receive ample notice. The Engineer informed him that the returns for the past month had been very much more satisfactory. The fact was that when they had such a miserable month as September had been, gas shareholders could rejoice, as it increased their profits, though it was not very comfortable for the community generally.

The DEPUTY-CHAIRMAN (Mr. W. G. BRADSHAW) seconded the motion.

The CHAIRMAN, in answer to Mr. Ennis, stated that they were put on very favourable terms by their bankers in connection with the amount borrowed from them.

The resolution was carried unanimously; and the dividends recommended were afterwards approved.

Mr. GEORGE LIVESEY, in proposing a vote of thanks to the Chairman and Directors, observed that such a vote was earned better in depressed times than during prosperity. He did not agree with everything that the Chairman had said as to the position of gas. The wheel went round. Sometimes they were at the bottom; but they were sure to be at the top again. He had the fullest confidence that gas would hold its own. It was doing so in the Commercial district; and he had not the slightest doubt that, notwithstanding adverse circumstances, gas companies would still go on prospering. One great essential for them, however, was that they should be able to get cheap capital. All their capital cost them about 7½ per cent.; whereas the Company on the other side of the water got their new capital at 3½ per cent., or perhaps less. This made all the difference between making extensions prosperously or the reverse. He was sure the Directors were well aware of this; and it was only the shareholders who required to have it pointed out to them.

Mr. ENNIS, in seconding the motion, remarked that Mr. Livesey, at their last meeting, argued that they ought to abandon the privilege they possessed of having their capital issued to them at par. He was not sure that they could all endorse such a view, because it amounted to this—that when the bargain was in favour of the Company, the shareholders were practically to abandon it. This was the gist of Mr. Livesey's observations at the last meeting; and he did not think the proposition would commend itself altogether to the shareholders. He was glad that Mr. Livesey had not brought it forward again. In that rested the difference between cheap and dear capital. There appeared to him to be no reason why the shareholders should abandon their privilege because the whirligig of time had made matters in their favour. It might have been the other way; and a bargain ought to be adhered to in any event. There was a privilege in distributing their capital at par; and he believed that this privilege only rested at present with their Company.

Mr. LIVESEY said he thought he would be able to convert Mr. Ennis when he could have a quiet talk with him.

Mr. ENNIS: I think not.

Mr. LIVESEY: Anyway, the shareholders have only had one issue of new capital in the last fifteen years, and that is not much.

The resolution was carried unanimously.

The CHAIRMAN, in acknowledging the vote, said they were always very glad to see Mr. Livesey among them. They could congratulate him on having obtained an Act which he thoroughly approved of, and which the South Metropolitan shareholders also approved of. It was very cheerful to hear such a Past Master in the art of gas making tell them not to despair, and that they were going to have good times again. Perhaps he himself generally took a somewhat pessimistic view. Mr. Livesey did not; and they were very glad to see a brighter tone imparted by their friend. Continuing, he proposed a vote of thanks to the Engineer, Secretary, Accountant, and other officials, to the value of whose services he warmly testified.

The DEPUTY-CHAIRMAN seconded the motion, which was carried unanimously.

The ENGINEER (Mr. H. E. Jones), in acknowledging the vote, said he was inclined to adopt Mr. Livesey's view of gas prospects rather than that of his own Chairman. The East of London had been under a heavy drag for the last eight or ten years. The London County Council had been pulling down streets and clearing away areas; and better buildings were being erected. The great docks had also gone farther down the river. In this way, there had been a considerable falling off in the consumption of gas. Gentlemen were also present who knew Whitechapel and the East of London generally; and they were aware how stagnant matters had been there. Unfortunately, this state of things could not have been foreseen. He was sure that the coin-meter business would prove very important to them, and that it was more lasting and stable than the higher kind of trade. But the pickings from it were a little nearer the bone; and it wanted a good deal of money, which, as Mr. Livesey had said, came to them rather dearly. There was a good deal to be said as to Mr. Livesey's view on this point, though their minds were quite open on the subject.

The SECRETARY also acknowledged the vote; and the proceedings then terminated.

ALLIANCE AND DUBLIN CONSUMERS' GAS COMPANY.

The Half-Yearly Meeting of this Company was held last Wednesday—Mr. EDWARD FOTTRELL, J.P., in the chair.

The SECRETARY and MANAGER (Mr. W. F. Cotton) read the notice calling the meeting; and the Directors' report, the main points of which were given in last week's issue, was then taken as read.

The CHAIRMAN, addressing the shareholders, said, comparing the accounts with those of the corresponding half of last year, it would be

found that the rental for gas was less by £5516. This was mainly owing to the reduction in price which took place in the beginning of the year; the delivery of gas being only slightly under that for the corresponding period. The working, however, had been satisfactory in regard to the yield of gas per ton of coal and the unaccounted-for gas; the coal carbonized having been less by 1937 tons. He regretted to say that the income from residuals had again shown a decrease; their market value being lower than ever before experienced. However, notwithstanding these facts, it was satisfactory that the Directors were enabled to recommend dividends at the rate of 10½ and 7½ per cent. on the respective shares. Electric lighting had made little way; and he had no doubt that gas would hold its position. The use of incandescent burners would largely increase the sale of gas, as they tended to develop its illuminating power; and consumers were beginning to avail themselves of them. The demand for gas for cooking and heating had also daily increased; and he was glad to say that gas for lighting purposes was now, through prepayment meters, within reach of people in humble circumstances who could not afford to run quarterly accounts. When last the shareholders met, he called attention to the Improvement Bill which was being promoted in Parliament by the Corporation; and he then informed them that clauses had been introduced into the Bill relating to the Company which did nothing more nor less than seek to confiscate their property, and that it would be necessary to defend their interests. As already informed by the Directors' report, the Bill was submitted to a Committee of the House of Lords. After hearing all the evidence the Corporation were able to produce on June 10, 11, and 12, the Committee expunged the gas clauses without hearing the Company's Counsel on the subject, or calling for even a single witness to defend the Company's case. Possibly it was to be regretted that the Lords' Committee came to this decision without hearing evidence or Counsel on the part of the Company, which they were prepared to submit, as they would have shown that the reports heretofore made by the Corporation were valueless, and not in accordance with the statutes under which the Company were working. He might go so far as to say that they would have satisfied the citizens that the Company were strictly complying with the obligations imposed upon them by Parliament, not only as regarded the quality of the gas, but in every other respect. It was very hard that the Company were obliged to incur a heavy expenditure in defending their rights. The cost of opposing the clauses had amounted to £3364, in addition to which they had to incur an expenditure of £452 in the corresponding period, when the Corporation also introduced a Bill containing similar clauses, but which was subsequently stopped by the vote of the ratepayers of Dublin. The revenue had been charged with the whole of this expenditure; but ultimately it came out of the pockets of the gas consumers, as but for this expenditure the profits would have been sufficient to have paid the dividends without having recourse to the reserve fund to the extent of £1530. In addition to this expenditure, the ratepayers would be mulcted in the cost incurred by the Corporation. He regretted to say that the Corporation Gas Committee had again commenced to issue reports on the illuminating power of the gas which were not made in accordance with the statute, and he might state were without foundation. The Directors had frequently called on the Corporation to prove these reports; but they had failed to do so. He could only say that the Company were prepared, at all times, to establish their case in any Court of Justice. Perhaps it was that the Corporation had in view the promotion of another Bill in the next session, and that these reports were made with the view of getting the citizens to support their project. Before concluding, he recognized the attention paid by the Company's officials in all departments in the discharge of their duties; and he also made particular mention of the sad death of Mr. John Cotton, son of the Company's respected Secretary, to whose ability and energy, he remarked, they could all bear testimony, and who gained the goodwill of every person with whom he came in contact. With these observations, he moved the adoption of the report and accounts.

Mr. J. R. WIGHAM, J.P., the Deputy-Chairman, seconded the motion.

Mr. COFFEY called attention to the item of law charges and parliamentary costs, £3664, and asked if any struggle or any exertion was made before the Committee of the House to put the payment of these costs on the proper shoulders—those of the Dublin Corporation.

The CHAIRMAN said the question was a perfectly legitimate one. He felt very strongly on the matter himself before he left the Committee-room. But it must be borne in mind that they were dealing with the Corporation of Dublin; and therefore they thought it better, perhaps, not to go too strongly antagonistic to them in claiming what they were justly and fairly entitled to. This much he would certainly say, that should such an occasion again arise, they would not allow the matter to lapse in the same way.

Mr. J. ABRAHAM inquired whether there had been any approach to arbitration between the Company and the Corporation.

The CHAIRMAN replied that there had been several interviews with Committees of the Corporation; but no good followed them. The fact was that one day it would be one thing, and next day another.

Mr. ABRAHAM remarked that the gentlemen he saw before him comprised almost the collective wisdom of Dublin; and it was strange that something could not be done to come to a conclusion with the Corporation as men of business. He thought it was a culpable matter if everything had not been exhausted before going to Parliament.

The CHAIRMAN said the Directors did everything they possibly could; and the action of the Lords' Committee justified them in their attitude. They felt they could not budge an inch as trustees of the shareholders' money.

Mr. ABRAHAM said he was glad to hear this explanation. The Company had been put to great expense; and he saw the Corporation had run the citizens into an outlay of £12,000.

The motion was then adopted.

Dividends at the rate of 10½ per cent. on the old shares, and 7½ per cent. on the new shares were declared.

Mr. COFFEY, in proposing a vote of thanks to the Chairman and Directors, said that every step that had been taken in the foolish litigation provoked by the Corporation had ended to the advantage of the Company. Those members of the Corporation who had any discretion and judgment, he was quite sure would not pursue so wicked a course again—a course calculated to cost the taxpayers of the city large sums of money.

Mr. W. ANDERSON, J.P., seconded the resolution, which was unanimously agreed to.

The vote having been acknowledged,

Resolutions were passed thanking the Secretary and staff for their unremitting attention to the interests of the Company, and also condoling with Mr. Cotton in his bereavement.

Mr. COTTON, having responded, remarked that Committees of the Board had met Committees of the Corporation over and over again. He supposed that, if he went through the books, he would find half-a-dozen meetings; but they all ended in smoke. They could not agree on anything; and the questions agreed on one day would be altered the next.

This concluded the proceedings.

CARLISLE CORPORATION GAS AND WATER SUPPLY.

Progress in the Past Financial Year.

The report of the Gas, Water, and Baths Committee of the Carlisle Corporation, with the accounts for the year ending June 30, has been issued. We learn therefrom that the consumption of gas in the first half of the financial year showed a very large increase as compared with the same period of the preceding twelve months; but, owing to the very mild weather prevailing during the winter and spring, there was a considerable diminution in the second half. The net increase in the quantity of gas made was 10,269,000 cubic feet, or equal to 4·10 per cent. The gross profit for the year was £8987. As in the case of other gas undertakings, there was a falling off in the returns from the sale of coke and sulphate of ammonia; but there was an improvement in tar. A steady increase is recorded in the revenue from water; the net rental for the year being £8335. The gross profit was £5166—an increase of £460. The gross profit on the two departments was therefore £14,153. After payment of income-tax and other charges, there was a total of £13,186 to be handed over to the city and district funds, as compared with £11,890 last year.

Accompanying the Committee's report is one by the Engineer and Manager (Mr. C. B. Newton, Assoc.M.Inst.C.E.). It shows that the quantity of gas made was 260,423,000 cubic feet, as compared with 250,154,000 cubic feet—an increase, as remarked in the Committee's report, at the rate of 4·10 per cent. (It may be mentioned parenthetically that of the total quantity of gas made, all but 11,242,600 cubic feet was accounted for.) The use of gas for all purposes continues to increase satisfactorily. The coal and cannel carbonized amounted to 24,162 tons 6 cwt.; the quantity of gas produced per ton being 10,778 cubic feet. At the close of the financial year, the number of consumers, based upon the accounts, was 7705, of whom 1456 were supplied through automatic prepayment meters. The total bulk of water pumped was 375,982,170 gallons—a decrease of 21,137,094 gallons as compared with the preceding year; being at the rate of 23·35 gallons daily per head of the population. Of this quantity, 18·90 gallons were used for domestic, and 7·45 gallons for trade, sanitary, and other purposes.

The accounts show that up to June 30 there had been expended on fixed plant for the manufacture and supply of gas a sum of £118,739, of which £2192 had been laid out during the preceding twelve months on new mains and services. Beyond this, £1167 was spent on new meters. The sale of gas produced £28,587; meter-rents, £860; residuals, £5764; and other items brought the total revenue up to £35,920. On the other hand, the manufacture of gas cost £22,314 (coals figuring for £14.552, and wages and maintenance for £6915); its distribution, £1771; and the total outlay was £26,933 —leaving a balance of £8987. The expenditure on fixed plant at the water-works amounted on June 30 to £72.457; £699 having been laid out in the twelve months. From the water-rents, amounting as already mentioned, to £8335, a total of £2737 was taken for maintenance, and another of £431 for management—together, £3168; leaving £5167 to go to the profit and loss account.

SALFORD CORPORATION GAS DEPARTMENT.

Application for Borrowing Powers.

At a Special Meeting of the Salford Town Council held recently, the Chairman of the Gas Committee (Mr. Holland) proposed the adoption of two recommendations relating to financial matters. The first was in favour of an application to the Local Government Board for sanction to borrow a sufficient sum of money to cover the estimated requirements of the Committee for capital purposes for the five years ending March, 1901, amounting to £85,000, and including £13,268 already applied for. The second was in favour of an application to the Local Government Board for sanction to borrow £6648, being the balance of £134,000 authorized to be expended for gas-works purposes by the Provisional Orders Confirmation (No. 14) Act, 1891. With regard to the amount required for capital purposes, Mr. Holland explained that the Corporation obtained a Provisional Order for the £85,000; but the Swinton and Pendlebury District Council insisted on inserting in the proposed Act clauses which the Committee could not accept; and the Bill was therefore withdrawn. They now intended to revive the Order where they dropped it, if this could be done. They had not in the meantime seen any reason to alter either the character or the amount of the estimates laid before the Council and the Local Government Board Inspector. One of their reasons for wishing to revive the Order was that this might do away with the necessity of holding another inquiry, although, of course, if another inquiry was held, all the evidence would have to be gone into. The £6648 referred to in the second recommendation was the balance of £134,000 required for ordinary expenditure on mains and services, meters, and contingencies. The motion was seconded by Mr. Phillips, and carried.

WAGES AND HOURS OF LABOUR AT THE LEEDS GAS-WORKS.

Some Comparative Statistics.

As already intimated in the "JOURNAL," the gas workers of Leeds, through their Union, have renewed their application for concessions in respect of wages and hours of labour which were refused them by the Corporation Gas Committee earlier in the year. They now request that the wages of stokers and firemen should be advanced from 5s. to 5s. 9d. per shift; that the remuneration of coal wheelers should be increased from 4s. to 4s. 9d. per shift; that purifiers should receive 4s. 6d. instead of 4s. per shift; that yardmen, who now work nine-and-a-half hours a day, should only work eight hours, and should receive 4s. per shift, instead of 3s. 8d.; and that cindermen should also have their wages advanced from 3s. 8d. to 4s. per shift.

When they refused to grant the demands of the men on the last occasion, the Gas Committee collected some statistics showing the wages paid, and the conditions of labour prevailing, in numerous other towns. The stokers in Bradford, it was said, receive 5s. for an eight-hour shift, during which they have to carbonize about 56 cwt. of coal; Bolton, 5s. for carbonizing 68 cwt. in eight hours; Carlisle, 5s. for carbonizing 45 cwt. in twelve hours (the stokers wheeling their own coal, taking coke into the coke-yard, and attending their own fires); Huddersfield, 5s. for carbonizing 45 cwt. in eight hours (stokers doing their own firing, and wheeling out coke); Halifax, 5s. for carbonizing 64 cwt.; Leicester, 5s. for carbonizing 64 cwt. in eight hours; Middlesbrough, 5s. 3d. for carbonizing 45 cwt. in eight hours (doing their own firing); Nottingham, 5s. per shift, and 1s. 6d. per week "good time money," for carbonizing 63 cwt. per man per shift of eight hours; Oldham, 5s. for carbonizing 63 cwt. in eight hours; and Salford, 5s. for carbonizing 70 cwt. in eight hours. The Leeds stokers get 5s. for carbonizing 60 cwt. in eight hours, and have firemen and coal-wheelers to help them. The purifiers at the Manchester Gas-Works get 22s. and 24s. for working 54½ hours a week; Oldham, 22s. 3d. for 50½ hours; Salford, 22s. for 54½ hours; Huddersfield, 22s. 1d. for 50½ hours; Bolton, 22s. for 54½ hours; Nottingham, 24s. for 53 hours; Middlesbrough, 22s. for 53 hours; Bradford, 24s. for 49½ hours; and Halifax, 22s. 1d. for 53 hours. In Leeds the purifiers receive 24s. 3d. a week of 54 hours. The yardmen of Manchester are paid 22s. for working 54½ hours a week; Salford, 22s. for 54½ hours; Huddersfield, 22s. 1d. for 50½ hours; Bolton, 22s. for 54½ hours; Nottingham, 22s. for 53 hours; Middlesbrough, 22s. for 53 hours; Bradford, 21s. and 22s. for 49½ hours; and Halifax, 22s. 1d. for 53 hours. In Leeds the yardmen are paid 22s. for working 54 hours a week. To have conceded the demands of the Leeds men in full would, according to the Gas Committee, have increased the annual expenditure paid in wages in the Gas Department by £9850. The present application, it is contended, will, if granted, add to the wages' bill of the Committee by nearly £8000 annually. Messrs. Smith and Wood, the officials of the Gas-Workers' Union, urge that it is misleading to attempt to institute a comparison between the wages paid in Leeds and those received by gas workers in other towns, whose conditions of labour are altogether different. In Bradford, for example, the stokers are paid 5s. a shift, and have to carbonize 56 cwt. of coal, and attend to their own fires. In the Leeds Gas-Works there are firemen specially employed for the latter purpose; but, on the other hand, the Leeds stokers have to slack their own coke at the retorts, and wheel it into the yard, or to the opposite side of the retort-house—work which in Bradford is done by special men. They contend that the hand-stokers of Leeds have a harder time than the majority of hand-stokers engaged in other towns. Many of the retorts at the Leeds works, they say, were only intended to take 2½ cwt. of coal; and the men being compelled to charge them with 3 cwt., they are choked up, making the work of drawing a much more difficult task than it otherwise would be. Again, burning this increased quantity of coal materially adds to the heat given off by the retorts, and proportionately adds to the discomfort of the stokers.

It is understood that the Union officials have received a communication from the Gas Committee, in which that body express their willingness to receive a deputation from the men at a meeting to be called at an early date; but the officials are anxious that the conference should take place before the November elections. The gas workers, they state, are tired of "being put off," and are determined, if the Committee do not soon make a move in the matter, to take the initiative themselves. Ever since the strike of 1890 was brought to a termination, discontent has again and again manifested itself among the men with the agreement that was signed at that time by the then officials.

GAS PROFITS AND ELECTRIC LIGHTING LOSSES AT LEICESTER.

At the Quarterly Meeting of the Leicester Town Council last Tuesday, the Gas and Electric Lighting Committee submitted their usual report upon the accounts of the departments under their charge for the half year ending June 30. It stated that the net profits on the gas undertaking, after paying interest on capital, was £11,571. Out of this had been paid £3262—the half-year's amount of sinking fund—which left a balance of £8309 to be applied at the end of the financial year, March 31 next, as the Council might direct. The result of the working of the Electric Lighting Department was a loss, after charging £584 on sinking fund account, of £723, after taking credit for £151, the profit from the electric lighting fitting business. This amount, together with £1337 loss to Dec. 31 last, made a total loss in connection with this department of £2060. The total amount which had been paid on account of sinking fund was £1882. The Committee further reported that it had been decided to reduce the price of coke disposed of by local sales from 10s. to 8s. 4d. per ton.

Alderman LENNARD, in moving the adoption of the portion of the report relating to the Gas Department, said that the Committee had borrowed more than they were authorized to do by £3502. He went into the accounts in detail, and said that, though their revenue was decreased by £499 and their expenditure by £549, the works were never so valuable as now; their value having been increased by many thousands of pounds. When one looked all round, he thought the Council had reason to be satisfied with the net balance of £8309. He hoped that the second half of the year would be better than the first.

The motion was adopted.

Alderman LENNARD next moved the adoption of the statement referring to the Electric Lighting Department. He remarked that he thought his prophecy would come true—viz., that the first year there would be a loss, this year they would have a clean balance-sheet, and next year they would make more than they lost the first year. The Committee would recommend a reduction in the price of the current supplied, from 6d. to 5d. per unit, from Jan. 1 next.

Mr. SMITH seconded the motion.

Alderman COLEMAN said he had been under the impression that the reduction in the price of the current would take place from the present month of October.

Alderman LENNARD replied that the Committee wanted to produce an absolutely clean balance-sheet for the year before they made the reduction; and they thought that a clean sheet would be made this year.

The motion was adopted.

A CHANGE IN THE LONDON GAS SUPPLY.

Under the above heading, the "Engineer" recently made the following observations: "A singular feature, likely enough to be overlooked, presents itself in regard to the consumption of gas in the area supplied by the London Gas Companies. Since 1892, there has been a constant decline in the consumption of gas per private consumer in the Metropolis. It may be said that in regard to 1893 this is not at all remarkable, seeing that the total consumption of gas fell off in that year by a very appreciable quantity. But in 1894, when the total consumption of gas in the Metropolitan districts showed an increase, there was still a decline in the consumption per private consumer. Now, again, last year the same result repeats itself; the total consumption exhibiting an increase, while the quantity per consumer undergoes a decrease. A reference to the successive issues of Field's 'Analysis' will show that, while the total consumption of gas in London has risen from less than 28,000 million cubic feet in 1892 to more than 29,000 millions in 1895, the quantity per private consumer has fallen from an average of 82,313 to 69,489 cubic feet. Private lights consumed in the aggregate less gas in 1893 than in 1892; but in 1894 there was a moderate increase, followed last year by a decided advance. Yet although the private lights consumed considerably more gas last year than in 1894, the average per private consumer fell from 73,000 to 69,000 cubic feet. The explanation must be mainly sought in the fact that there is a large increase of small consumers. The penny-in-the-slot system—or to adopt the more refined designation, the automatic prepayment meter—is introducing gas, both for lighting and heating purposes, where it was formerly unknown. In their last half-yearly report, the Directors of The Gaslight and Coke Company state that more than 42,000 of the prepayment meters are now fixed in the Company's district. Mr. George Livesey has lately announced that during the last four years the South Metropolitan Gas Company have laid on gas to more than 50,000 workmen's dwellings. The effect is very marked. In 1892, the consumption of gas by the private consumers of the South Metropolitan Company averaged 78,816 cubic feet; whereas last year the average was only 57,585 feet, although the private lights supplied by the Company consumed 7274 million cubic feet of gas last year, compared with 6194 millions in 1892. If we take the twelve Suburban Gas Companies tabulated by Mr. Field, we find the private consumption rising from 4199 million cubic feet in 1892 to 4820 millions in 1895; but the average consumption in that period fell from 60,482 to 56,820 cubic feet. The figures throughout are instructive, and serve to show that the Gas Companies find it to their interest to cultivate a class of trade which previously attracted but little of their attention. While the electric light is finding a home in large establishments, in huge hotels, in railway stations, and in aristocratic mansions, gas is being made available for the smaller structures occupied by the working classes. Threatened in the higher sources of their revenue, the Companies are doubtless feeling the wisdom of multiplying their small friends. It is important also to observe that cooking as well as lighting is concerned in this new state of things—tending so far to the benefit of the Metropolitan atmosphere. The rate at which the London Gas Companies are increasing the number of their customers helps to show how they are strengthening their hold on the democracy. Quoting only round numbers, and starting with 318,000 consumers in 1892, there is an increase of 10,000 in 1893, of 22,000 in 1894, and of 45,000 last year. Public lamps have increased less rapidly; going up in the same period from 75,000 to 77,000. It may be said, with regard to the private lights, that the reduced consumption per customer is in some measure due to the more economical methods by which gas is now burned. There is no doubt that this is in some measure true; but the extraordinary increase in the number of consumers serves to show that the use of gas in London is being popularized in a remarkable degree—indicating a wise policy on the part of the Companies."

The Poll on the Sleaford Water-Works Purchase Question.—The result of the poll of the ratepayers of Sleaford on the question of the proposed purchase of the water-works was made known last Wednesday, and to the members of the District Council, at least, was a great surprise; the figures being, against the purchase 507, for the purchase 444—majority against, 63. An examination discloses the fact that of 1300 voting-papers delivered, 863 only were handed back, 326 persons actually voted against the purchase, and 342 actually voted for it (giving on single votes a majority of 16 in favour), there were 18 spoilt papers, and 177 blank papers, representing 200 votes. The Company and their supporters worked hard to secure this result.

ELECTRIC LIGHTING NOTES.

The Electric Lighting Committee of the St. Pancras Vestry sustained a nasty rebuff at last Wednesday's meeting of the Vestry. The Baths and Washhouses Committee reported that they had considered the Vestry's instruction of the 22nd of July, to "consider and report as to the advisability of installing the electric light at the baths and washhouses; the cost of wiring the building to be borne by the Electricity Department, and the price for current to be at the same rate as for public lighting—viz., 5d. per unit—in accordance with the resolution of the Vestry of June 13, 1894." The Committee reported that gas practically served as a heating apparatus as well as an illuminant during the winter, and that, if it were done away with, hot-water pipes would have to be laid. They recommended that no alteration should be made in the present system of lighting the baths and washhouses. The Chairman of the Committee (Mr. S. R. Lamble), in moving the acceptance of this recommendation, said the annual cost of electricity as an illuminant would be twice that of gas; while the latter, as pointed out by the Committee, served to heat the buildings. There was also the cost of installation to be considered. Dr. Walter Smith moved that the matter be referred back to the Committee; expressing the opinion that the present condition of the baths was disgraceful as far as light was concerned. Dr. J. Wigg thought no alteration should be made at present. Mr. Lazarus pointed out that, if gas were no longer used, hot-water pipes would have to be laid on all over the buildings; and the cost of this would, he said, be a big item to be added to the cost of installation and additional annual outlay accruing on the substitution of electricity for gas. Other members having spoken, Mr. Lamble agreed to take back the recommendation for further consideration by his Committee. It is to be hoped that they will "stand to their guns," and so save the pockets of the ratepayers. After this Mr. Knott wanted to know the reason for the deficient lighting in the Fitzroy Square district; but he withdrew the question on the understanding that the matter would be thrashed out at the next meeting. In the Regent's Park district, too, the light has been very eccentric lately; and the Chief Electrical Engineer reports that this is due to bad stoking, resulting in the stoppage of steam. He recommended that the culpable stoker be suspended; and the Vestry agreed that he be asked to resign. What with bad stoking, complaints of consumers, and the snubs of their own Committees, the St. Pancras Electricity Department have not a particularly happy time. It is interesting to note that the following instructive clause appears in the Committee's report: "Pursuant to instructions, your Committee are further considering measures to be adopted to prevent any similar interruption of the public lighting; and they will report fully to the Vestry on the subject as soon as they have decided on the most practical means to accomplish the object in view."

If one may judge from what appeared recently in a local paper, when commenting upon the proceedings at the meeting of the Ventnor District Council on the 21st ult., at which the question of introducing the electric light into the town was discussed, the desire for a change of systems has been engendered by the "dislike and distrust with which the Gas and Water Company are regarded by the governing body of the town." It is to be regretted, if such a failure exists; but the worthy councillors should not let it lead them into embarking upon an undertaking which may prove costly. The Council have received a proposal from an electric lighting firm in the following terms: (1) The Council to apply for a Provisional Order, undertaking to transfer it to the firm in question, or their nominees; the firm paying the costs incurred. (2) The transfer of the Order to carry power to the Council to purchase the works upon terms to be agreed; those suggested being 15, 10, or 5 per cent. on the capital expended, if the purchase was made at the expiration of seven, fourteen, or twenty-one years. (3) The price to be charged not to exceed 8d. per unit, with a sliding-scale reducing it to 7d. to large consumers; all current required by the Council for the street lighting to be supplied at the rate of 4d. per unit. A report was presented by the Electric Lighting Committee stating that they had had a conference with the representative of the firm; and they recommended that the matter of the proposed Order should be referred back to them, with power to take the necessary steps for obtaining the Order, and to approve of the draft agreement. The Chairman moved the adoption of the report; and, after a considerable pause, the motion was seconded by Mr. Grant. In reply to a question, the Chairman stated that the first instalment of expenditure would be about £10,000 or £15,000 if further light was required. Mr. Ingram thought they were going ahead too fast. He advised that the part of the resolution giving the Committee power to act, should be struck out, and in its place the words substituted, "That the Committee obtain the draft agreement, examine it, and report upon it to the Council." He pointed out that the area over which the light would be supplied should be defined, and the time within which it would be provided should be limited. These questions, he urged, should be settled before the Council went too far. Mr. Cox advised the exercise of care; pointing to the case of Fareham, in which £4000 damages were incurred in connection with an electric lighting compact. Mr. Gibbs said he did not like the thought of the Council binding themselves to the proposing firm or any other; and if they obtained a Provisional Order, they ought to keep it in their own hands. He contended that there was no great hurry; and he advised that, before they bound themselves, they should obtain evidence from impartial sources as to the cost and success of electric lighting in towns of the size of Ventnor. He thought a small community like theirs should not be so ready to make experiments of this sort. A good and efficient water supply was a great necessity; and he would much rather spend money in purchasing the undertaking of the Gas and Water Company than in law costs and visionary efforts. Rev. J. H. Shaw expressed the opinion that Mr. Gibbs had spoken wisely. He feared that if the Council "rushed" the matter, they would only involve themselves in difficulties, as Mr. Ingram had pointed out. After some further remarks, the motion was altered to the effect that the Committee should obtain the draft agreement, and report thereon to the next Council meeting. By the time this is held, it will probably be too late for application for the Order to be made this year.

Several of the important thoroughfares of Dublin were in partial darkness on the night of the 27th ult. None of the electric lamps on the west side of O'Connell Street were alight; and the same was the case on the western side of Parliament Street and Capel Street, and the south sides of College Green and Dame Street. Cork Hill was almost in total darkness; no electric lamps being lighted there.

The Southampton Corporation are now in actual possession of the electric lighting works, for which they have handed the Company a cheque for £21,100. The Local Government Board sanctioned the loan for the purpose for fifteen years; and, in addition, they have granted their permission to the borrowing of £28,900 for twenty-five years for new buildings and extension of works, and of £5300 for fifty years for purchasing land. The Company's staff has been retained.

The Fleetwood District Council have disposed to a private firm of the powers they possess under their Electric Lighting Order; and application will now be made to the Local Government Board for the confirmation of the transaction. The price given has not been made known so far; but it is said by those concerned that the terms and conditions are favourable to the Council and the town. By a special clause in the agreement, the Council have power to acquire the undertaking at the expiration of a specified period, and the scale of charges has been fixed. The private firm are bound to make a substantial commencement of works within a few months of completing the transfer.

The Belfast Corporation last week decided to add a new gas-engine and dynamo to their plant at the electric-light station, at a cost of £1125. The Electric Lighting Committee have under consideration the advisability of putting down a steam-driven installation; and they will report fully on the subject at an early date.

EAST LONDON WATER-WORKS COMPANY.

Half-Yearly Report and Accounts.

The report of the Directors of the above-named Company, with the accounts for the six months ending June 24 last, has been issued, in view of the half-yearly general meeting of proprietors next Thursday. The revenue from all sources was £153,458, as compared with £150,151 in the corresponding half of 1895—an increase of £3307. The expenditure (including £1140 paid to the Chamberlain of London) was £77,826; whereas in the six months ending June 30, 1895, it was £83,565, with a payment of £2493 to the Chamberlain—a diminution to the extent of £5739. The Directors remark that the increase in the revenue and the decrease in the expenditure would have contrasted still more favourably with that of the period of comparison, had there not been heavy legal and parliamentary expenses. The extensions of works, machinery, and mains are proceeding speedily and satisfactorily; and the whole of the plant is stated to be in excellent condition. The new services laid on in the six months covered by the report numbered 2659, against 2018 in the first half of last year. The total number now in supply is 185,900. With regard to the quality of the water, the Directors point out that the reports of Dr. Frankland, the Government Analyst, as well as those of the chemists who test on behalf of the Companies (Messrs. Crookes and Dewar), continue to show that it is of a high standard of purity. The present report has been looked for with considerable interest, in view of the violent attacks which have been made upon the Directors for the course they took during the recent long-continued drought, which, following three successive years of remarkably low rainfall, necessitated a temporary resort to an intermittent supply. The serious responsibility of keeping up the service under such conditions was sufficient of itself to cause the Directors and officials very great anxiety; but to it was added the vexation of seeing themselves charged with having shamefully—even "criminally"—neglected their duties. They only remark on this matter, however, that it is impossible to discuss, in the limits of their report, the causes and effects of the late interruption to the constant service; and they express the intention of shortly issuing a pamphlet, embodying some conclusive articles and letters which have appeared in the newspapers upon the question, together with extracts from the reports of the parliamentary proceedings on the Company's Bills of 1893 and 1894. These particulars will probably be derided by a certain section of the Press; but they will, there can be little doubt, show clearly who are really responsible for a great deal of the inconvenience suffered by many of the consumers in the Company's district. Brief reference is made to the parliamentary work of the past session. The Water Bills of the London County Council were all rejected on second reading; and the East London Water (Height of Supply) Bill was, at the same stage, negatived without a division. The measure introduced by Lord James of Hereford on behalf of the Government—the Metropolitan Counties Water Board Bill—passed through all its stages in the House of Lords, and went down to the Commons on the 18th of June; but it could not be proceeded with. The Directors close their report by recommending a dividend on the ordinary stock at the rate of 3½ per cent. for the half year, less income-tax. This will absorb £60,220 out of the £60,481 available for distribution; leaving a balance of £261 unappropriated. In the corresponding six months, the disposable sum was £63,134.

The Sea Water Scheme for London.—The London Sea Water Supply Company have issued a circular-letter to all the London Vestries and Local Authorities in Surrey and Sussex, pointing out that the Bill authorizing the supply of sea water from Lancing to London has received the Royal Assent, and asking the authorities concerned to sign a letter in favour of the project for using sea water for sanitary purposes, for swimming baths, and the like. If the carrying out of the scheme depends upon the tacit sanction of the authorities, no time will be lost in commencing operations; for nearly all the Vestries, Works Committees, Public Baths Committees, &c., have signified their approval of the scheme.

EASTBOURNE WATER SUPPLY.

The Corporation and the Water Company's Works—A Remarkable Proposal by a Resident.

With regard to the intention of the Eastbourne Corporation, as announced in the "JOURNAL" last week, to make another attempt to acquire the undertaking of the Eastbourne Water Company, we learn that active measures are being taken to renew the conflict which proved so abortive last autumn. The members of the Corporation appear to be very confident that this time the poll will be in their favour. Why this should be the predominating feeling is not very clear to those who are not councillors; for, so far from the Company's works being in a weaker position than they were, they have become, if anything, stronger by extensions. Since last October, a supply of water which has been pronounced by Dr. Frankland to be of excellent quality for all domestic purposes, and which has found favour with the inhabitants, has been obtained from an entirely new source by permission of the Duke of Devonshire (the Chairman of the Company), upon his Grace's property at Holywell; and as soon as the opposition to the Bill of last session had been withdrawn, without waiting for the passing of the measure, the Directors began further works on the Duke's land at Friston, as well as on other land at Wannonk. At Holywell, the works have been considerably developed, and promise well for the future. The water is obtained there from headings driven above high-water mark. A number of random statements have been circulated in regard to the attitude of the Duke. It has been alleged that he is willing to part with his interest in the Company, and has expressed his intention of not opposing any application which may be made to Parliament by the Corporation to obtain compulsory powers to acquire the undertaking. In view of these, his Grace has deemed it advisable to give a flat denial to all such assertions. On the contrary, should any fresh application be made to Parliament, he will give his utmost support to the Company, who would, of course, strenuously oppose any proposition to purchase by the Corporation. In the meantime, a remarkable scheme has been brought forward by a resident in the town—Mr. J. W. Hobbs. He states that he is prepared to undertake to deliver to the pumping-station of the Water Company two million gallons per day of soft water, suitable for dietetic and domestic purposes, to do all the boring required, to build an engine-house, supply engines and pulsometers, and lay a double 12-inch main from Hurstmonceux to the pumping-station, and to acquire all rights of way, purchase land, pipes, machinery, &c., for £100,000. Of this sum £10,000 is to be paid down (£4000 going for the purchase of the Wargroves Estate of 35 acres), and the balance within twelve months after the completion of the works. He offers also to keep the works and plant in proper order for £2000 per annum.

BARNSLEY CORPORATION WATER SCHEME.

Officials Rewarded—Mr. Hawksley to Supervise the Construction of the Works.

At the Meeting of the Barnsley Town Council last Wednesday, the minutes of the Water Committee containing the recommendation as to the appointment of Mr. C. Hawksley to supervise and control the construction of the new water-works were introduced for confirmation by Alderman Raley. He first took the opportunity of explaining the action of the Committee in granting £450 each to the Town Clerk (Mr. H. Horsfield) and the Borough Surveyor (Mr. Taylor) for extraordinary services in connection with the water question. The work of these officials in this matter actually commenced in October, 1894; and they were both engaged in making preliminary inquiries and negotiations which necessitated the expenditure of a large amount of their time. The Council, he maintained, could not have been better served; they had saved money, and therefore they were justified in generously treating these two gentlemen. Mr. Foulstone spoke strongly in opposition to the Committee's action; but the Council showed their confidence in the members by passing a hearty vote of thanks to them. Proceeding to refer to the minutes, Alderman Raley commented upon the speech of Alderman Gainsford, at the meeting of the Sheffield City Council on Aug. 12 (*ante*, p. 512). Alluding to certain meetings between himself and Alderman Gainsford, Alderman Raley said it was known, through ordinary channels, that they could obtain a supply of 133,000 gallons of unfiltered water, delivered at Wortley, at 5d. per 1000 gallons, with a minimum charge of £10,000 per annum. In addition to this, they would have had to filter the water, and to lay the pipe-line from Wortley to Barnsley, which would have been very expensive. The £10,000 would not have been extended over 60 years, as their loan would be. They asked the Sheffield Committee plainly: "Will you or will you not modify your terms?" and also requested them to fix a minimum, with an increasing amount. They merely replied in the negative; and the Committee did not feel justified in recommending that the offer be accepted. Ultimately terms of settlement were made in the House of Lords, and adopted in the House of Commons, for Sheffield, upon which they could settle the matter. These were eventually agreed upon; but, from the first, Barnsley had been willing to accept the terms upon which they agreed. They suggested to Sheffield that the Engineers might arrive at some arrangement; and the reply was that it was obviously impossible. They, he contended, made every attempt to settle the matter amicably. There had been a waste of money; and had it not been for the Sheffield opposition, their costs at Westminster, instead of being £15,000, would not have been £5000. Sheffield were determined to oppose Barnsley; but fortunately they were unsuccessful. Sheffield wanted to have all the control and management. This was a very serious matter, though they were assured Barnsley would be all right for a supply of water even in seasons of drought; and Sheffield offered to bind themselves with a money fine in the event of not carrying out the agreement. The Committee knew that the money could not give them water; and they decided it was necessary they should control their own works. Alderman Gainsford estimated under the joint scheme the cost would have been 4·36d. per 1000 gallons for 18 or 20 years; and when the works were in full swing, it would be 3·84d. He also estimated that the Barnsley scheme alone would cost 6·09d. per 1000 gallons for 18 or 20 years, and 3·82d. afterwards, and that the terms they had offered would be an advantage of 1·75d. to Barnsley for 18 or 20 years, and afterwards the cost would be a fraction less. He (Alderman Raley), however, could not agree with the figures. From their information, it would appear that for the first 18 years the cost would only be 4·16d. per 1000 gallons for unfiltered water; and he presumed that was the calculation of Alderman Gainsford. Their estimate compared with Sheffield showed a saving to Barnsley for 18 or 20 years of £339; and during the 19 years, it would amount to a total of £6450, instead of the large sums which it was predicted they would have to pay. They believed their estimates were correct. Alderman Gainsford had referred to the parliamentary costs of £15,000; but he (the speaker) would remind them of the profits derived from the scheme. From their present works they had a profit last year of £3700; and if they had not that to take to the rates, they would have to increase the water charges. They had carefully inquired into their estimates; and he believed they had not exaggerated. During the ensuing discussion, it was stated that the estimate of the amount upon which Mr. Hawksley would be entitled to commission would be £110,000. The questions of contract work as against the proposed day work and the payment of Mr. Hawksley were raised; and an amendment was moved by Mr. Foulstone that the work be done by contract. A vote was taken; and the amendment was defeated by twelve votes to four. The minutes were then confirmed.

THE WATER SUPPLIES OF NOTTINGHAM AND NEWARK.

The Corporations of Nottingham and Newark are likely to come again into conflict in the next session of Parliament in connection with their water supplies. Both authorities are proposing to ask for powers to extend their limits of supply—to some extent into the same area.

A special meeting of the Nottingham Corporation was summoned for yesterday, to consider the propriety of promoting in the ensuing session of Parliament a Bill to empower them to extend the limits within which they may supply water, including therein the following parishes—viz., Calverton, Woodborough, Lambley, Oxton, and Epperstone, and such other places as Parliament may prescribe in the county of Nottingham. Also to enable them to acquire lands, sink wells, and construct all works necessary for the purpose of obtaining and utilizing an additional water supply.

The Newark Corporation held a special meeting yesterday week, for the purpose of considering the question of promoting a Water Bill in the next session of Parliament. Mr. Doubleday moved a resolution to the effect that it was expedient to promote in Parliament a Bill to alter and amend the provisions of the Newark Corporation Act, 1891, and their Provisional Order of 1893, by including within the limits of supply of the Act the parishes of Oxton, Epperstone, Rufford, Bilsthorpe, Eakring, Kirklington, Maplebeck, Winkburn, Hockerton, Park Leys, Caunton, Bathley, North Muskham, South Muskham, Bulcote, Lowdham, Gonalston, Hoveringham, Thurgarton, Halloughton, Bleasby, Fiskerton, Rolleston, and Staythorpe, in the county of Nottingham. He said they wished to include these villages as they were within a reasonable radius of their pumping-station at Farnsfield; but it would be at the option of the inhabitants whether or not they took the water. The Corporation would have to bear all the expense, as the villages would be charged nothing for pipe laying, but would get the water on precisely the same terms as the residents in Newark. Alderman Earp, in seconding the resolution, said this step was necessary in order to protect their water supply from possible encroachment. The resolution was carried unanimously, as was also a further one that the Corporation be enabled to construct works, and borrow the money necessary for the purposes of the Bill.

Hull Corporation and the Gas Supply.—An important move was made in connection with the gas supply of the borough by Alderman Massey at a meeting of the Hull Corporation last Thursday. He proposed—"That a Special Committee be appointed to inquire and report as to the terms upon which the undertaking of the Kingston-upon-Hull Gas Company can be acquired by the Corporation, and the price at which the necessary gas for the lighting of the Old Town can be obtained from the British Gaslight Company, Limited." The Alderman remarked that he only asked that a Committee should be appointed; and it would not commit the Council to anything. Every member knew what was in view; and he would leave it with them. Mr. Cohen offered to second the motion if Alderman Massey would include the names of the other Gas Companies; but this Alderman Massey said he could not do. Mr. Lengfield seconded the motion, which was agreed to without opposition. A Committee, consisting of nine members, was at once appointed.

The Southwark and Vauxhall Water Company's Charges.—One result of the refusal of the Southwark and Vauxhall Water Company to supply the new Town Hall at Rotherhithe with water under the scale in operation for places of business (see *ante*, p. 516) has been the discussion of the Company's charges; and last Thursday, Mr. Glanville called the attention of the Vestry to the exceedingly high prices paid by the authorities under various agreements, and moved that a Committee of twelve members should be appointed to make a report on the question. He said the Vestry were paying, under a variety of complicated and peculiar arrangements, no less than £850 a year for water supplied to public institutions in the parish. In many cases, the Company were having 8½d. per 1000 gallons, when they were only entitled to 6d.; and the Vestry were deprived of the legal deductions. On one bill of £138, the Company were charging £30 more than they were entitled to. Mr. Parkinson seconded the motion; and it was carried unanimously.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

A singularly strange situation has arisen in Edinburgh. During the last session of Parliament, the Corporation of Edinburgh somewhat prematurely promoted a Bill for amalgamation with Leith and Portobello, and for the appropriation of a part of the county of Mid-Lothian. The constituted authorities in Leith and in the county objected to being swallowed up by their big neighbour; but the burgh of Portobello came to terms, and consented, with the result that Portobello is now incorporated with the capital. Leith is still a separate Corporation—for how long it would be difficult to say, for there is scarcely anything more certain in this world than that Leith will have to succumb to the demands of Edinburgh for incorporation. But the exclusion of Leith has landed the Corporation of what I may in the meantime call Edinburgh-Portobello in a fix. It arises in this way: Edinburgh and Leith are conjoined in the matter of gas supply; but when Edinburgh and Leith agreed to promote the Gas Act of 1888, which enabled them to acquire the undertakings of the Edinburgh Gaslight Company and of the Edinburgh and Leith Gas Company, it was specially stipulated that the burgh of Portobello was to be excluded from the area of supply of the Gas Commission which was created. Since 1888, the arrangement has worked felicitously and successfully; but now comes the difficulty that, Edinburgh having absorbed Portobello, and Leith not having joined in, the arrangements which Edinburgh has made for the lighting of Portobello cannot be taken over by the Edinburgh and Leith Gas Commission. One of these arrangements is that Edinburgh shall acquire the undertaking of the Portobello Gaslight Company. This has been done; and so far everything has been plain sailing. But as to the future there is dubiety. The Edinburgh and Leith Gas Commission are by statute debarred from supplying gas in Portobello; and the Edinburgh Corporation are, by their agreement, and by the Act of Parliament which they have secured, bound to undertake the supplying of gas in Portobello, and at the same price as in Edinburgh. As I have said, the Corporation of Edinburgh have acquired the undertaking of the Portobello Gaslight Company; but the question is who is to manage it. To get out of the difficulty, it has been resolved that the City of Edinburgh—the amalgamated city, I suppose—shall adopt the Burghs Gas Supply (Scotland) Act, 1876, and shall then, as a Corporation, undertake the management of the gas-works in Portobello. On Tuesday of this week, a motion was made in the Edinburgh Town Council, and agreed to, that the Act be adopted; and instructions were given for the calling of a meeting of the citizens, which is required by statute, for the adoption of the Act. I am not satisfied that there is time now for the adoption of the Act, according to strictly legal form; but as most probably nobody will be found objecting to the step, it is likely that the movement will be carried through without challenge. Assuming that it is, there will then be the situation of the City of Edinburgh being lighted by a Commission, conjoined with Leith, who will have at their command all the resources of a larger undertaking, and the benefits to be derived from the employment of the best talent procurable; and the Corporation of Edinburgh, as owners of the small Portobello Gas-Works, obliged to work them, no matter at what cost, according to the scale, and without the advantages, of the larger works. As I have indicated above, the arrangement is only likely to be for a few years, because, whenever Leith comes to be incorporated, there will no longer be any necessity for the Burghs Gas Supply Act being in force, as then, with Leith as a co-owner, the lighting of Portobello will naturally fall within the jurisdiction of the Edinburgh and Leith Gas Commission.

The Edinburgh and Leith Gas Commissioners held their first meeting for two months on Thursday, and transacted business of very little bulk in one sense, but of very great importance in another. Such important subjects as the valuation of the works belonging to the Commissioners and the fixing of the price of gas came up for consideration. The Engineers' reports showed that there had been an increase in the quality of gas manufactured since May 16 over the same period of last year of 12,708,000 cubic feet. The Works Committee had had before them a report by Mr. J. S. Gibb, the Treasurer, to the effect that, assuming the amount and quality of gas to be sold during the current twelve months to be the same as last year, and to be produced from coal alone, as before, the net cost of manufacture would be 22·55d. per 1000 cubic feet. To this there would fall to be added capital and other charges, 10·99d.; and unaccounted-for gas, 2·81d.—making the total cost 36·35d. On the basis of this report, the Committee recommended the Commissioners to supply gas of from 24 to 26 candle power, at the price of 3s. per 1000 cubic feet, subject to the present rates of discount; and to charge for gas for public lighting 2s. 1½d. net per 1000 cubic feet. They also recommended, on the advice of Mr. Masterton, Manager in charge of the Edinburgh works, that the gas supplied through automatic prepayment meters should be charged at the rate of 1d. for 24 cubic feet. Bailie Kinloch Anderson said they would observe, from the returns regarding the consumption of gas, that they were on the right side. They recommended that gas should be supplied under the same conditions as last year. The value of residuals had fallen; but if they should rise in price during this year, and when they got the full benefit of their stoking machinery, they anticipated that next year they might be able to do better. A statement of the quantity of gas manufactured, cost, &c., from 1888 had been put into the hands of the Commissioners; and the Works Committee specially referred to the manufacture of gas in the Edinburgh works. They said that they felt great disappointment at the cost of coal, manufacture, and distribution of the gas which was made at these works; and they strongly urged the Engineer to exercise every economy in future. The cost had been considerably higher than it was at Leith; and the leakage had been more than double that at the latter works. He had no doubt now that the attention of the Engineer was called to the matter, he would try to reduce it. The recommendations of the Committee were adopted. The Finance and Law Committee reported that the Assessors had valued the Commissioners' gas undertaking for the current year as follows: Burgh of Edinburgh, £30,895, as against £46,546 last year; burgh of Leith, £7900, as against £12,152; County of Edinburgh, £1195, as against £2075; and County of Haddington, £70, as against £113—a total decrease of £21,186. Mr. Kinnaird asked for an explanation of the decrease. The Lord Provost said the valuation was fixed upon the profits for the year. Last year they reduced the price of gas, and they had less profit. In fact, they should try not to have any balance at all; and thereby they would give the public the benefit of cheaper gas, and would save taxation.

Regarding the valuation of the works, it has to be observed that the Commissioners have at last awakened to the fact—which has been recognized and acted upon by other Corporations for years—that it pays not to make a profit, because, if you secure a large profit, the tax-gatherer comes round and requires you to pay upon it. I do not say that the Edinburgh people have been wrong, for I rather think it is the system of valuation which is faulty. But the question of how to value undertakings such as gas-works is a very difficult one; and it is recognized by everyone connected with the matter that a proper method of assessing them has not yet been arrived at. On the matter of the price of gas, it is to be observed that the Commissioners have, for the second year in succession, elected to play for a deficit. They consider they can afford to do so, and more particularly as they expect to be able to derive benefit from the full employment of their stoking machinery, and, possibly in the latter part of the current year, of the carburetted water-gas plant. I do not know what the water-gas plant may do; but on the subject of the stoking machinery, I think I could, if it were desired, disillusionize the Commissioners. I state, frankly, that so long as they are pursuing their present policy, the stoking machinery they have introduced they may expect to benefit them very little. The statement to which Bailie Kinloch Anderson alluded should show them that they have not benefited as they ought to have done by the introduction of stoking plant. It brings out that the total cost of coal, manufacture, and distribution in connection with the Edinburgh works last year, amounted to 25·66d. per 1000 cubic feet; whereas in Leith, where there was no such thing as mechanical stoking, the total cost was only 22·10d. per 1000 cubic feet. These figures have apparently set some of the Commissioners thinking, as they assuredly ought to do. But as to the remedy—well, they probably will have difficulty in finding that out. No amount of economical vigilance on the part of staff in the retort-house will bring it about; it lies elsewhere, and chiefly within themselves.

On Sunday night last, a large congregation assembled in Newington Parish Church, Edinburgh, to witness the inauguration of an installation of electric lighting. All went well, as the newspaper reports of railway and shipping accidents say, until just as the benediction was about to be pronounced, when the light failed, and gas had to be used to enable the congregation to disperse. It was the old story—a fuse had melted. A more powerful one has been put in; but then comes the question—if the first fuse was supposed to be the right thing to make the premises safe from fire, where does safety come in when the fuse is one which will not give way at the point of danger?

The Gas Committee of the Dundee Corporation have, on the motion of one of those individuals who seem unable to make up their minds without knowing what other people are doing, obtained a return showing in how many other places there is only one charge for gas, irrespective of the use to which it is put. The list includes the South Metropolitan Company, Birmingham, Bradford, Middlesbrough, Edinburgh, Glasgow, Aberdeen, Greenock, and Paisley. Presumably the gentleman who was the occasion of this return being obtained will now feel himself justified in holding that in Dundee they should follow the example of so many other towns. Now, in a matter of this kind, the practice of one town is little or no guide to the authorities of another. In every place, local circumstances ought to regulate the practice. But more than that, the return is fallacious. There are some places—such as Glasgow—where a fixed uniform rate is charged, and no abatement is allowed on any account. In others—some of them included in this return—discounts are allowed, on various grounds; and thereby a differential rate is established. The return—the result, I suppose, of a begging-letter move—is consequently worth no more than the paper upon which it is written.

The Edinburgh Water Trustees fixed their water-rates for the current year on Monday. Mr. Colston, the Convener of the Finance Committee, said they recommended that the domestic rate be fixed at 5d. per pound, which is ½d. less than last year; and that the shop rate be fixed at 2d., and the public rate at 1d.—both the same as last year. The estimated expenditure is £91,217, and the estimated revenue from special supplies £42,039; leaving £49,178 to be raised by assessment. The finances of the Trust were now in a sound condition. They were at present engaged in bringing in water from the Talla at a cost, it might be, of £700,000; and while they were providing for the interest upon the capital expenditure on these works, they were able to reduce the water-rate by ½d., which represented a saving to the community of about £3000 per annum. The undoubted prosperity of the Trust arose from three causes: First, there was the unlimited assessing power possessed by the Trust, which made the monetary advances to them rank as a first-class security; then there was the low rate of the money market, and the facility with which money could be borrowed at a small rate of interest; and, thirdly, there was the steady increase of the population, with the result of large additions to the rateable property in the district. The great and increasing demand for water for shipping and trade purposes, and the large revenue derived therefrom, had contributed in a material degree to the present satisfactory state of affairs. It appeared, from the Treasurer's statement, that the 5d. per pound domestic rate, along with the estimated increase of revenue, calculated at 2 per cent., and the judicious application of the surplus revenue on hand, would be sufficient to meet the increased expenditure upon the new works up to 1901, by which time the new supply scheme was expected to be completed. The calculation of 2 per cent. was less than the average increase of the past five years, which was about 4 per cent. He moved the adoption of the Committee's recommendations. Ex-Bailie Archibald, of Leith, in seconding, referred to the small increase to the water in store which had resulted from the recent rains. He said that Gladhouse, which was their largest reservoir, had only risen some 6 inches, and that at the beginning of September it was about the lowest it had been for the last ten or twelve years. They were working up to their maximum resources; and there was no prospect of additional supplies being got from the Talla for five years at least. This implied

the utmost care in checking waste and in economizing the water. In May last, when the Trust found it necessary to warn the community of the shortness of the supply, the consumption fell about 1,500,000 gallons per day. This showed what the people could do for themselves. They all felt that they were not a day too soon in securing a new supply. They had been fortunate in getting all the land in the Talla watershed at a reasonable price. They would in about two months be asking estimates for the construction of the Talla reservoir, which, with the tunnels in the track, would take about four years to complete. They had avoided all arbitration as yet; and there was only one question outstanding—the fisheries—which they expected would be settled without incurring an expense of £2000 or £3000 in arbitration. The recommendations of the Finance Committee were adopted.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Oct.* 3.

Sulphate of Ammonia.—After a slight improvement, occasioned by "covering" orders for delivery within the month of September, the market has relapsed into its previous weak condition; and the closing quotations are £7 7s. 6d. f.o.b. Leith, £7 10s. Hull, and £7 11s. 3d. Liverpool. The speculative element is more than ever in evidence; and "bears," instead of covering their October sales at present favourable prices, seem chiefly concerned to make further sales in the forward position. There are sellers for delivery up to the end of the year at a slight premium on spot prices; and for January-June delivery at a premium of 5s. to 7s. 6d. per ton. Makers generally have for some time been offering their production as it has become available; but, for the most part, they have refused to sell ahead. In Scotland and London, however, makers have been more open to treat for forward business; and sales for January-June delivery are reported at £7 12s. 6d. per ton, Beckton terms, and at £7 17s. 6d., ordinary terms, f.o.b. Leith.

Nitrate of Soda is quiet in all positions; but spot quotations remain at 7s. 10½d. per cwt. for ordinary, and 8s. for fine quality.

LONDON, *Oct.* 3.

Tar Products.—Pitch at last is showing a little life—*i.e.*, there are more inquiries, although buyers so far have not brought their ideas up to sellers' figures. Some business has been done during the week at the prices quoted below. The value of pitch, however, is now largely dependent on its constituents. Indeed, south country pitch is barred from many markets, owing to its friable character, and want of agglomerating properties. The question of the value of tar is also much agitating the minds of distillers. Midland and west country tars contain several gallons of benzol per ton; while east coast or south country tars, or any tar made from Durham or Newcastle coal, contain very little, and in some instances none. The important advance in benzols is, therefore, only advantageous to those distilling tars containing it. Benzol is moderately firm, but production is greater; and apparently there is less eagerness to purchase. Anthracene is quoted somewhat lower, but the Tar Products Sales Committee's prices remain as fixed some months ago.

The average values of products are as follows: Tar, 18s. 6d. to 27s. Pitch, 28s. 6d. to 31s. Benzols, 90's, prompt, 4s. 9d.; forward, 4s. 1½d.; 50's, prompt, 3s. 4d.; forward, 3s. 1½d. Toluol, 2s. 5d. Solvent naphtha, 1s. 5d. Crude, 30 per cent., naphtha, prompt, 1s. 5d.; forward, 1s. 3d. Creosote, 1¾d.; liquid, 2¼d. Heavy oils, 45s. Naphthalene, pressed, 60s.; salts, 32s. 6d. Cresylic acid, 10½d. Carbolic acid, 60's, 1s. 9d. Anthracene, "A," 10d.; "B," 8½d.

Sulphate of Ammonia.—Important business has been done at prices ranging between £7 7s. 6d. and £7 12s. 6d., less 3½ per cent. f.o.b.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—The coal trade here is without materia change; and pits generally are not kept going more than four days per week, with stocks accumulating where more than this is being worked. Supplies of steam coals continue excessive, and prices extremely low. At the pit mouth, average prices are now about 9s. 6d. to 10s. 6d. per ton for best Wigan Arley; and 8s. to 8s. 6d. for Pemberton four-feet and seconds Arley. There has been more business doing recently in the shipping trade; but the sales made have been at very unsatisfactory prices. Ordinary steam coal delivered at the ports on the Mersey, or at the Manchester Ship Canal, does not fetch on the average more than 6s. 9d. to 7s. per ton.

Northern Coal Trade.—There is now a more decided movement in the coal trade; and the possibility of a labour movement soon should induce the large users of coal to increase their stocks, as it is in contemplation to hold a conference to endeavour to force up the rates of wages in Scotland and in this district. As it happens, however, the autumn trade of Northumberland is fast passing away, and the end of the Baltic trade will make many of the collieries have to resort to short time; so that, as far as that county is concerned, the movement would be a futile one. But it may be otherwise in the gas coal district; and hence the desirability of larger stocks being obtained by the users. There is a growing demand for gas coals; and the shipments are being rapidly made. The collieries are therefore now working more satisfactorily, though not yet up to the full productive power. For single cargoes, the price varies from 6s. 6d. up to 7s. 3d. per ton f.o.b., according to the quality and the position of the colliery. This month the deliveries are expected to be very large. Gas coke shows no alteration this week, either in price or demand.

Scotch Coal Trade.—There is continued activity in all branches, with slight advances in price in some. The miners have resolved to abandon the four days a week policy, and to work five days. One of the best features of the market is the steady demand for steam coal, which shows that industrial pursuits are improving. The prices quoted are: Main, 6s. 3d. per ton f.o.b. Glasgow; and ell, 7s. The shipments for the week amounted to 152,414 tons—a decrease of 17,477 tons on the preceding week, and of 13,451 tons on the same period of last year. For the year to date, the total shipments have amounted to 5,700,370 tons—an increase over the corresponding period of last year of 228,181 tons.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST (see ante, p. 636).

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
590,000	10	15 Apl.	10½	Alliance & Dublin 10 p. c.	23—25	..	4 4 0
100,000	10	"	7½	Do. 7 p. c.	18—19	..	3 18 11
300,000	100	1 July	5	Australian (Sydney) 5 % Deb.	108—110	..	4 10 11
200,000	10	12 June	5	Belgrano (B. Ayres), Limited	10—10½	..	4 15 3
100,000	Stck.	26 June	5	Do. 5 p. c. Deb. Stk	100—103	..	4 17 1
200,000	5	29 May	6½	Bombay, Limited	7⅞—8½	..	3 18 9
40,000	5	"	6½	Do. New, £4 paid	5½—6	..	4 6 8
380,000	Stck.	13 Aug.	12	Brentford Consolidated	285—290	..	4 2 9
210,000	"	"	9	Do. New	215—220	..	4 1 9
50,000	"	"	5	Do. 5 p. c. Pref.	140—145	..	3 9 0
159,375	"	12 June	4	Do. 4 p. c. Deb. Stock.	130—134	..	2 19 9
220,000	Stck.	16 Sept.	11½	Brighton & Hove Original	242—247	..	4 13 1
208,820	"	"	8½	Do. A Ord. Stk.	185—190	..	4 9 5
933,500	Stck.	28 Aug.	5	Bristol, 5 p.c. max.	127—132	..	3 15 9
420,000	20	27 Mar.	11½	British	57½—58½	..	3 16 11
50,000	10	28 Aug.	11½	Bromley, Ordinary 10 p. c.	22—23	..	5 0 0
71,000	10	"	8½	Do. 7 p. c.	19—20	..	4 5 0
500,000	10	29 Apl.	6†	Buenos Ayres (New) Limited	10¾—11¼	..	5 6 7
200,000	100	1 July	6	Do. 6 p. c. Deb.	103—106	..	5 13 2
150,000	20	15 July	8½	Cagliari, Limited	29—31	..	5 6 5
100,000	10	30 Sept.	6	Cape Town & District, Ltd.	17—18*	+¾	3 6 8
50,000	50	2 May	6	Do. 6 p. c. 1st Mort.	58—60	..	5 0 0
550,000	Stck.	15 Apl.	13½	Commercial Old Stock	345—350	..	3 17 2
165,000	"	"	10½	Do. New do.	260—265	..	3 19 3
165,000	"	12 June	4½	Do. 4½ p. c. Deb. do.	152—157	..	2 17 3
800,000	Stck.	12 June	13	Continental Union, Limited.	287—292	..	4 9 0
200,000	"	"	10	Do. 7 p. c. Pref.	220—225	..	4 8 11
51,600	Stck.	28 Aug.	14	Croydon Com'cial A 10 p. c.	315—320	..	4 7 6
163,400	"	"	11	Do. B 7 p. c.	250—255	..	4 6 3
535,000	Stck.	28 Aug.	5½	Crystal Palace Ord. 5 p.c. Stk	140—143	..	3 13 5
60,000	"	"	5	Do. 5 p. c. Pref.	140—145	..	3 9 0
486,090	10	15 July	11	European, Limited	26—27	..	4 1 6
354,060	10	"	11	Do. £7 10s. paid	18—19	..	4 6 11
5,746,590	Stck.	13 Aug.	12¾	Gaslight & Coke, A, Ordinary	306—311	+3	4 2 0
100,000	"	"	4	Do. B, 4 p. c. max.	110—115	..	3 9 7
665,000	"	"	10	Do. C, D, & E, 10 p. c. Pf.	305—315	..	3 3 6
30,000	"	"	5	Do. F, 5 p. c. Prf.	147—152	..	3 5 9
60,000	"	"	7½	Do. G, 7½ p. c. do.	212—217	..	3 9 1
1,300,000	"	"	7	Do. H, 7 p. c. max.	207—212	..	3 6 0
463,000	"	"	10	Do. J, 10 p. c. Prf.	305—315	..	3 3 6
476,000	"	"	6	Do. K, 6 p. c. Prf.	173—178	..	3 7 5
1,061,150	"	12 June	4	Do. 4 p. c. Deb. Stk.,	138—143	..	2 15 11
294,850	"	"	4½	Do. 4½ p. c. do.	153—158	..	2 16 11
908,000	"	"	6	Do. 6 p. c. do.	207—212	..	2 16 7
70,000	10	14 May	6	Hongkong & China, Limited	12—13	..	4 12 4

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p. c.	GAS COMPANIES.			£ s. d.
3,800,000	Stck.	14 May	12	Imperial Continental.	248—253	+1	4 14 10
376,400	100	1 Aug.	4	Do. 4 p. c. Debs. Red.	100—103	..	3 17 8
473,600	Stck.	13 Aug.	3½	Do. 3½ p. c. Deb. Stk	108—110	..	3 3 8
75,000	5	26 June	6	Malta & Mediterranean, Ltd.	6—6½	..	4 12 4
560,000	100	1 Oct.	5	Met. of Melbourne, 5p. c. Deb.	113—116*	+½	4 6 2
250,000	100	"	4½	Do. 4½ p. c. Debs.	108—110*	+½	4 1 10
541,920	20	12 June	5	Monte Video, Limited	16½—17½	..	5 14 3
150,000	5	29 May	8	Oriental, Limited	8¼—8¾	..	4 11 5
135,000	5	"	8	Do. New, £4 10s. paid	7½—7¾	..	4 12 10
15,000	5	"	8	Do. do. 1879, £1 paid	1¾—2	..	4 0 0
60,000	5	16 Sept.	7	Ottoman, Limited	5—5½	..	6 7 3
420,000	100	1 May	6	People's Gas } 1st Mtg. Bds.	105—110	..	5 9 1
500,000	100	1 June	6	of Chicago } 2nd Do.	102—107	..	5 12 1
250,000	10	30 Sept.	10	San Paulo, Limited	13—14*	..	7 2 10
5,475,000	Stck.	13 Aug.	5⅝	South Metrop., 4 p.c. Ord.	142—147	+2	3 10 9
820,000	"	15 July	5	Do. 5 p. c. Deb. Stk.	173—176	..	2 16 10
60,000	Stck.	16 Sept.	11½	Tottenham & Edmonton, A	260—270	..	4 5 2
60,000	"	"	8½	Do. B	180—190	..	4 9 5
170,380	10	29 May	10	Tuscan, Limited	13½—14½	..	6 18 0
149,900	10	1 July	5	Do. 5 p. c. Debs. Red.	100—102	..	4 18 0
				WATER COMPANIES.			
746,123	Stck.	26 June	10½	Chelsea, Ordinary	345—350	..	
150,000	"	"	5	Do. 5 p. c. Pref.	177—182	..	2 14 1
160,000	"	"	4½	Do. 4½ p. c. Pref. Stk., 1875	160—164	..	2 14
175,785	"	30 Sept.	4½	Do. 4½ p. c. Deb. Stock	162—167*	−¾	2 13
1,719,514	Stck.	15 Apl.	7	East London, Ordinary	232—237	..	2 19 1
654,740	"	26 June	4½	Do. 4½ p. c. Deb. Stk.	163—168	−2	2 13 7
225,000	"	"	3	Do. 3 p. c. Deb. Stk.	105—107	..	2 16 1
700,000	50	12 June	7½	Grand Junction, 10 p.c. max.	120—124	..	3 0 6
295,000	Stck.	30 Sept.	4	Do. 4 p. c. Deb. Stk.	150—155*	..	2 11 7
708,000	Stck.	13 Aug.	12	Kent	347—352	..	3 8 3
160,000	"	"	7	Do. New, 7 p. c. max.	217—222	..	3 3 0
1,043,800	100	26 June	7½	Lambeth, 10 p. c. max.	263—268	−2	2 16 0
406,200	100	"	7½	Do. 7½ p. c. max.	225—230	..	3 5 2
350,000	Stck.	30 Sept.	4	Do. 4 p. c. Deb. Stk.	150—155*	..	2 11 7
500,000	100	13 Aug.	12⅗	New River, New Shares	433—438	..	2 18 11
1,000,000	Stck.	30 July	4	Do. 4 p. c. Deb. Stk.	153—156	−2	2 11 3
902,300	Stck.	12 June	4	S'thwk & V'xhall, Ordinary	154—159	..	2 10 4
126,500	100	"	4	Do. Do. 7½ p. c. Max.	150—155	..	2 11 7
489,200	Stck.	"	5	Do. Do. 5 p. c. Pref.	175—180	..	2 15 6
1,019,585	"	30 Sept.	4	Do. 4 p. c. A Deb. Stk.	152—155*	+1	2 11 7
1,155,066	Stck.	12 June	10	West Middlesex	328—333	..	3 0 0
200,000	"	"	4½	Do. 4½ p. c. Deb. Stk.	165—170	..	2 12 11
					*Ex div.		

† Next dividend will be at this rate.

An Unfortunate Speculator in Water Gas.—In the bankruptcy of Mr. George Whitehead, of Starbeck, near Harrogate, the insolvency is mainly attributable to loss through the liquidation of the North British Water-Gas Company, and of the Yorkshire and Lancashire Water-Gas Company. The debtor has liabilities amounting to £854; and there are no available assets.

Sales of Shares.—At a sale by auction at Hastings last Tuesday, the following shares in the Hastings and St. Leonards Gas Company, the property of the late Chairman, were disposed of (the purchaser having to pay the stamp duty, &c.): Three £25 shares, earning 13 per cent., £78 15s. each; three similar shares, £79 15s. each; and three other shares, £80 each. Some £20 shares, earning 10 per cent., fetched the following prices per share: Six, £53; four, £53 5s.; six, £53 10s.; six, £53 15s.; four, £54. The next dividend is due in March, 1897. At a local sale on Friday, 29 £5 shares in the Wakefield Gas Company were sold for £13 6s. each, and four £5 "B" for £10 1s. apiece.

Gas Carburizing Company, Limited.—Under this title, a Company has been formed, with a capital of £50,000, in £1 shares, to adopt and carry into effect an agreement expressed to be made between Fried Krupp of the one part and the Company of the other, and to carry on the businesses of steel and iron masters, iron and brass founders, tinplate makers, metal workers, boiler makers, machinists, millwrights, metallurgists, engineers, colliery proprietors, miners, builders, manufacturing chemists, shipowners, shipbuilders, charterers of vessels, carriers by sea and land, dock owners, wharfingers, miners, smelters, &c.; also to acquire and turn to account patents, patent rights, &c.

Tavistock Gas Company.—In the report presented at the annual meeting of the Tavistock Gas Company held yesterday week, the Directors stated that several imports had been made at the suggestion of Mr. Stormonth; and the works and plant were in good condition. The sale of gas during the past year was the largest on record; the receipts amounting to £2130 for private consumption, and £406 for public lighting. On the motion of Mr. H. T. Doble, who presided, the report was adopted, and an interim dividend of 8s. per share was declared. Cordial thanks were passed to the Directors for the manner in which they had looked after the interests of the Company; and also to Mr. A. Francis, the Manager and Secretary, for his untiring energy in the Company's behalf.

The Collection of Gas Accounts at Truro.—The Truro Gas Company have decided to open central premises as offices and showrooms, and they have given notice to their consumers that the practice of collecting accounts will be discontinued. In future the accounts will be received at the new office, and the discounts hitherto allowed will be granted on payment within a month from the date of the invoice. The show-room contains an assortment of fittings, stoves, and other appliances; and the Directors are pursuing the sensible policy of inviting their customers to see what can be done with gas, and learn how it may be most economically used with a view to facilitate the execution of orders and the remedying of complaints. The offices are connected by telephone with the works.

Maidstone Corporation and the Water-Works.—A member of the Maidstone Town Council has given notice of a motion to the effect that application be now made for an Act of Parliament for the compulsory sale of the Water Company's undertaking. A resolution already stands on the books of the Council to the effect that the works should be acquired.

Increased Storage for the Oxford Gas Company.—Notwithstanding the competition of other kinds of artificial lighting, the output of gas from the works of the Oxford Gas Company has been so great during the past year, that the Directors have had to contract for the erection of a gasholder of the capacity of a million cubic feet, capable of being extended at a small expense to 1½ millions.

Ramsgate Corporation Gas-Works.—Last Tuesday, Mr. E. P. Burd, one of the Inspectors of the Local Government Board, held an inquiry at Ramsgate relative to the application by the Corporation for a Provisional Order to enable them to extend the gas-works on land recently acquired at Elgar's Field. Two owners of adjoining property opposed the application, on the ground that the works would be a nuisance, and prove prejudicial to the value of property in the neighbourhood. It was pointed out that, under similar circumstances, the Broadstairs Gas Company were compelled to erect their new gasholder on a site a considerable distance from the works. It was also contended that the smell from the works would be so offensive, and the scheme generally so objectionable, to the residents in the vicinity, that it would interfere with the letting of apartments. The Mayor (Mr. C. J. Gwyn) said the opposition was trivial; the objectors not appearing to understand the difference between gas storage and gas manufacture. What the Corporation proposed to do was simply to alter the position of the gasholder. The Inspector said he would view the site, and make his report in due course.

Gas Poisoning at Garston, Liverpool.—Last Thursday an inquest was held at Garston, Liverpool, on the body of Jane Lewis, aged 46, the wife of Robert Lewis, a sea captain, of Anglesea. From the evidence, it appeared that deceased went to Garston for the purpose of meeting her husband, and lodged at the house of a Mrs. Porteous. On the 23rd ult., Mrs. Lewis went to bed about midnight, and, as was her custom, locked the door of her room. A telegram arriving for her next morning, Mrs. Porteous went to the room about nine o'clock; but failed to gain admission. She tried again an hour later, with the same result; and it was not until 11.30 that she sent for a man to force open the window. Mrs. Lewis was then found lying in bed unconscious, her head hanging over the bedside, and her face and breast covered with foam. There was a strong smell of gas in the room, and the tap was found to be about a quarter on. The door was opened; but the woman was allowed to remain in the same room, even after four doctors had seen her—a fact upon which the Coroner (Mr. S. Brighouse) animadverted strongly. The woman lingered on, and died at 7.30 last Wednesday evening. The jury returned a verdict of "Accidental death;" but they considered that Mrs. Porteous had shown great negligence in not having had the room opened earlier in the morning.

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Explosion in a Public Lamp.—An extraordinary explosion of gas occurred in Castle Street, Farnham, last Thursday evening. Fred Baker, a lamplighter, in the employ of the District Council, was in the act of lighting a lamp, in which was a meter, when the explosion occurred. The lamp column was broken in the middle, and the door enclosing the meter was blown across the road. Baker was thrown to the ground, and was found by a medical man to be severely bruised and suffering from shock. His injuries, however, were not serious. Residents in the neighbourhood of the lamp say there had been an escape of gas at the lamp some days previously.

The Proposed Purchase of the Gravesend Water-Works by the Local Authorities.—The proposal that the Gravesend and Northfleet District Councils should purchase the undertaking of the Gravesend Water Company continues to occupy the attention of the bodies concerned, but more particularly the former. There is a growing opinion, both inside and outside the Council, that it is time the ratepayers should be taken into the confidence of the Councils, and that the report made by Mr. W. A. Valon, as circulated among the members of the Council, should be published. The Gravesend Council will not, however, sanction the circulation of the report, because "they have not yet made any progress with the Company as to the terms on which they are prepared to sell."

The New Water-Works of the Cardiff Corporation.—Last Wednesday, the members of the Cardiff Corporation paid a visit to the water-works in the Taff Fawr Valley. The chief object of the journey was to inspect the new No. 1 reservoir in the Taff Fawr. This great work is approaching completion; the embankment having been brought within 14 feet of the full height. The construction was commenced about 3½ years ago. Good progress has been made during the past twelve months; and it is expected that the reservoir will be finished and filled with water by this time next year. The capacity of the reservoir is 335 million gallons; No. 2—the Cantreff—holds 322 million gallons; and No. 3 (to construct which the Corporation have also power), 700 million gallons. With regard to the cost, Mr. J. A. B. Williams, the Engineer-in-Chief of the Taff Fawr works, estimated that for No. 1 reservoir it would be £198,000. The value of the work executed up to now is £177,000, and the amount spent is £173,000; so that there is a balance of £4000 in favour at the present time, which shows that the work is being done within the estimate.

New Water-Mains for Littlehampton.—Colonel C. M. Luard, R.E., recently held an inquiry, on behalf of the Local Government Board, in respect of an application of the Littlehampton District Council to borrow £1000 for street pavements and water-mains. The proceedings were quite formal. It was stated that the Duke of Norfolk would contribute about £300 towards the works.

Extension of the Horsham Water-Works.—Colonel C. M. Luard, R.E., lately held an inquiry, on behalf of the Local Government Board, in respect of an application by the Horsham District Council to borrow £1710 for purposes of water supply. It was explained that the proposed works included lining the headings discharging into the reservoir, and laying down new and larger mains.

Trial of Incandescent Gas-Lighting at Northfleet.—At a meeting of the Northfleet District Council last Tuesday, Mr. Boucher moved that part of the district should be lighted on the incandescent gas system. Mr. Rayfield seconded the motion. The Surveyor said he had tried the light outside the offices for five months; and though the consumption of gas was less, the expense of the mantles increased the total cost of the lighting quite 50 per cent. Mr. Gard remarked that the test was scarcely a fair one, as a properly constructed lamp had not been used. He suggested having a test made with proper lamps. Mr. Boucher agreeing, it was resolved to procure six lanterns and burners as a beginning.

Unsatisfactory Condition of the Tullamore Water Supply.—The inhabitants of Tullamore (King's County) are dissatisfied with their water supply—mainly on account of its present discoloured condition. During the past few weeks, the water (says a local reporter) has been absolutely useless for domestic purposes; and it has now been ascertained that the source is in a bog on the Slieve Bloom mountains above Clonaslee, to which cause the discolouration is attributed. The original estimate for the supply was £6000 odd; but more than £10,000 have now been borrowed, and the works are still in an incomplete and unsatisfactory state. Mr. J. H. H. Swiney, of Belfast, has been consulted; and he states that the filters should be four times as large as at present to meet the requirements of the town, and that, unless properly attended to, they are more a source of danger than otherwise. A public meeting of the ratepayers has called on the Local Authority to at once take such steps as may be necessary to remedy the matter.

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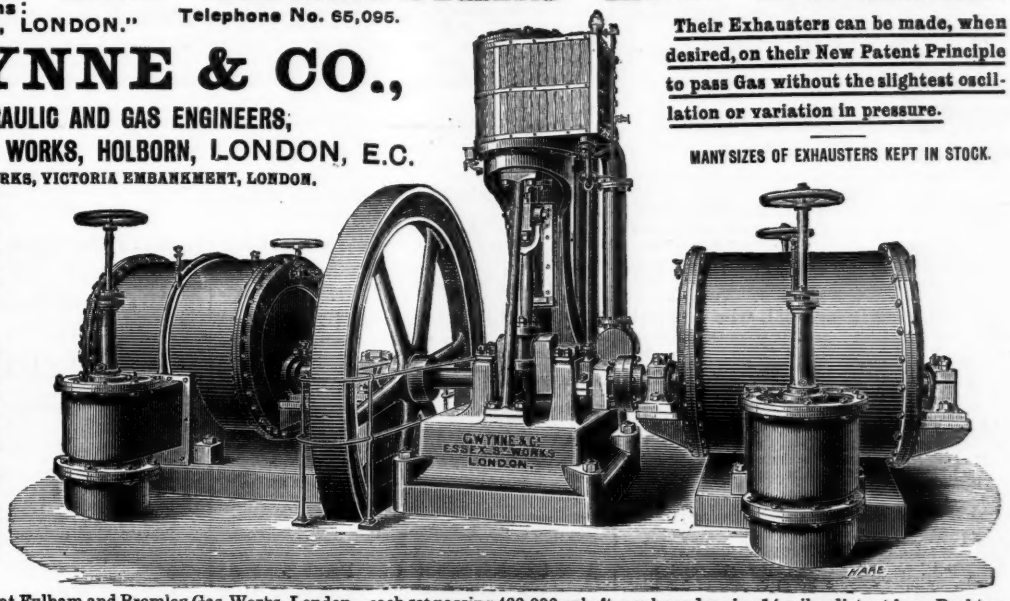

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[For Illustrated Advertisement see page 626.]

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Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS, should be received not later than the FIRST POST on SATURDAY.

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BROTHERTON AND CO., Chemical Manufacturers.
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SULPHURIC ACID for Sale.
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GOLD MEDAL, 1892.

TUBES and Fittings for Gas, Steam, and Water, in stock to 8 inches diameter; Iron and Steel Ascension-Pipes.
JOHN SPENCER, Globe Tube Works, WEDNESBURY; and 14, Great St. Thomas Apostle, LONDON.

HUTCHINSON BROTHERS, Gas Engineers, &c., Falcon Works, Barnsley, Makers of Wet and Dry Gas-Meters, Brass-Work, and general Gas Apparatus, Lead Saturators, Tanks, &c., Tools, and Gas-Works Sundries. (See p. 573, last week's Issue.)
Telegrams: "HUTCHINSON BROS., BARNSLEY."

HYDRATED OXIDE OF IRON.

PREPARED from pure Iron.
Two or three times as rich as Bog Ore.
Strong action on Sulphuretted Hydrogen.
To be used alone, but will increase activity of other Oxides.
Less than half the price of Bog Ore.
Can be lent on hire.
Write for tabulated results.
READ HOLLIDAY AND SONS, LIMITED, HUDDERSFIELD.

WANTED, Bricklayers, Retort Setters, and FURNACE BUILDERS.
Apply to JONAS DRAKE AND SON, Ovenden, HALIFAX.

WANTED, a Situation as Stoker in small or medium sized Gas-Works; Shovel Charging preferred. Used to Engine and Exhauster. Age 22; Married.
E. C. HARVEY, Gas-Works, Felixstowe, SUFFOLK.

WANTED, by a Gentleman, with twenty Years' Experience in the Coal and Shipping Trades, an appointment as AGENT for a good Gas or Steam Coal Colliery (or both) in Yorkshire.
Address No. 2722, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ADVERTISER (age 25), who has held position of INSPECTOR in large Gas Company, and lately returned from abroad, wishes re-engagement in similar capacity, or as Collector. Good knowledge of Service, Meter, and Stove work. References and security.
A. G., 242, KENNINGTON PARK ROAD, S.E.

SITUATION wanted by a Gas Engineer (aged 25) as WORKING MANAGER or FOREMAN of Small Works, or to look after Engine and Exhauster, Station Meter, &c., in large Works. Highest Testimonials.
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WANTED, a Stoker for a Small Works, to take Night and Day Shifts. Wages, 18s.
Apply, by letter only, to No. 2723, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a First-Class Gas-Fitter, of good address, acquainted with fixing Gas-Stoves and Fires, and with the reading and inspection of Meters.
Applications, by letter, stating Age and References, to No. 2721, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a Gas Company in South Wales, an experienced GAS-FITTER (age not over 35), thoroughly competent in all branches of House Fitting in Compo. and Iron, Meter and Stove fixing, Service and Main laying.
Apply, by letter, with References and *copies* only of recent Testimonials, to No. 2720, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

STRATFORD-UPON-AVON CORPORATION.
(GAS DEPARTMENT.)

WANTED, a Competent Man as Fitter, METER INSPECTOR, and REPAIRER, to do Smithing and General Repairs of Works, and to make himself generally useful. Must have a good character for Sobriety and Competency. To a suitable man the Appointment would be a permanency, and liberal Wages given.
Apply, with two recent Testimonials, stating Wages required, to
J. S. CRANMER, Manager.

NEW GAS PLANT CEMENT.

JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS, MANCHESTER.
For all Joints in connection with Oil-Gas Plant and Sulphate Plant.
For all Gas Joints.
For all Tar Joints.
For all Ammonia Joints.

SADLER & Co., Ld., Middlesbrough; ULVERSTON (BARROW); PORTSMOUTH; CARLTON (N.E.R.); and STOCKTON. Tar and Petroleum Distillers. Benzol and Petroleum Spirit, 700 and other Gravities specially prepared for Carburetting. SOLAR OIL for Gas Making. Kerosene, &c.
Correspondence invited.
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SULPHATE OF AMMONIA SATURATORS.

WALTER THOMASON and SONS, Chemical Plumbers, &c., and Makers of Lead Saturators, &c., 21, WESTON STREET, BOLTON. Repairs of every description.
Please write for Estimate before ordering elsewhere.

ECONOMY IN PURIFICATION.

INCREASE the Efficiency of your PURIFIERS by adopting CRIPPS'S PATENT BYE-PASS VALVE in the lower Tiers of Sieves. Practical Experience proves their Economy. Engineers are repeating orders after thorough trial.
References and Particulars can be obtained from the Makers—
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And J. EVERY & SON, Phœnix Iron-Works, LEWES.

In Paper Covers, Post Free 2s.

STEPHEN CARPENTER, late of the Bow Common Gas-Works, on the PURIFICATION OF COAL GAS BY LIME, &c., and the Method of Working Lime Purifiers so that the Lime may be used a second time, with a Description of a short Method of Working the Sulphur Test.
S. CARPENTER, "Ryde," Woodhouse Grove, East Ham, ESSEX; or of H. W. CARPENTER, 3, Bedford Villas, Carshalton, SURREY.

OIL-GAS BENZOL for Enriching Coal Gas. A few Thousand Gallons to dispose of.
Apply, by letter, in the first place, to No. 2714, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

PATENT RIGHTS for Sale for France and Germany of Thomas Glover and Co.'s PREPAYMENT METERS. This Patent is proving a great success in Great Britain, the Colonies, and the United States of America.
Apply to THOMAS GLOVER AND CO., LIMITED, 214-222, St. John Street, Clerkenwell, LONDON, E.C.

FOR SALE—A new small Rotary Gas EXHAUSTER, with Inlet and Outlet Valves. Can be fitted on combined bed with Engine, if required.
SELLERS, PICKERING, & Co., Gas Engineers, Ravensthorpe, YORKS.

FOR SALE—A Washer-Scrubber, with 6-inch Connections, 8 feet diameter, in four lengths, 17 ft. 9 in. over all. Manhole in each length.
Four CYLINDERS, 8 feet diameter, 4 ft. 3 in. each. Been used for Condensers.
Three 6-inch FOUR-WAY VALVES.
HYDRAULIC, with Connections complete.
All nearly new.
Apply to the EARL SHILTON GAS COMPANY, LIMITED.

A COMPLETE Gas Plant for Sale cheap. Also GASHOLDER, 45 ft. by 14 ft. PURIFIERS, sets of Four, 7 ft. by 4 ft.; 12 ft. and 14 ft. square; and two 8 ft. square. Kirkham WASHER. Engine and Pump EXHAUSTERS (Dempster's). ROTARY EXHAUSTERS; and other new and second-hand APPARATUS ready for delivery. Inquiries solicited.
J. F. BLAKELEY, Gas Engineer, Ravensthorpe, YORKS.

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GAS PLANT, &c., for Sale—Annular CONDENSER, MANN and WALKER TOWER SCRUBBER, 38 ft. by 8 ft., and a WALKER PURIFYING-MACHINE of 1 Million Cubic Feet capacity per diem. The Valves and Connections for the above are 12 inches diameter.
Particulars may be obtained on application to Mr. ISAAC CARR, Assoc.M.Inst.C.E., Gas-Works, WIDNES.

HADLEY AND THE TRENCH, NEAR WELLINGTON, SHROPSHIRE.

TO BE SOLD, as a going Concern, a compact GAS-WORKS—Eight Retorts, with Ascension-Pipes and Foul Main; double Row of 6-inch Pipe Condensers, 15 feet high, with Box, 11 feet long; two Purifiers, 8 feet by 6 feet by 4 feet; Station Meter and Gasholder, about 8000 Cubic Feet; and all other Accessories. Good Cottage on the Premises, which abut upon Railway Siding and Canal.
Apply to
ROB. AUG. NEWILL, Secretary,
Wellington, Salop.

PATENTS FOR INVENTIONS.

J. C. CHAPMAN, M.I.M.E. and Fel. Chartered Inst. Patent Agents. ADVICE ON ALL MATTERS CONNECTED WITH ABOVE, Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c. CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special Attention to Repairs.
Before placing Orders, please write for Estimate.

CANNEL, COAL, ETC.

JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 80, ST. ANDREW SQUARE, EDINBURGH, / NEWTON GRANGE, NEWBATTLE, DALKEITH, } SCOTLAND.

It is Worth Your While to Buy DIRECT.
THE RELIANCE LUBRICATING OIL COMPANY SUPPLY on APPROVAL "RELIANCE" NON-CORROSIVE LUBRICANTS (which, through their superiority, have the largest sale in the world)—viz., Engine, Cylinder, and Machinery Oils, 11½d.; Spindle Oil, 8½d.; Gas-Engine and Dynamo Oils, 1s. 6d. per gallon; Barrels Free and Carriage Paid. Also Liquids for Gas Making, Enriching, &c.
RELIANCE LUBRICATING OIL COMPANY, WATER LANE, GREAT TOWER, LONDON, E.C.
Depôts at Liverpool, Bristol, Hull, Glasgow and Newcastle-on-Tyne. Telegrams: "Subastral, London."

SOWERBY BRIDGE URBAN DISTRICT COUNCIL.
(GAS DEPARTMENT.)

THE Gas Committee are desirous of receiving TENDERS for CAST-IRON PIPES required at Sowerby Bridge and Luddenden Foot.
Specifications and Forms of Tender can be obtained on application to Mr. John Marsland, Engineer and Manager, Gas-Works, Sowerby Bridge.
Tenders, endorsed "Tender for Pipes," to be addressed to the undersigned, on or before the 12th of October, 1896.

GODFREY RHODES AND EVANS,
Clerks to the Council,
Commercial Bank Chambers, Halifax.
Gas-Works, Sowerby Bridge,
Oct. 1, 1896.

SOUTHEND WATER-WORKS COMPANY.

TO BRASS-WORKS MANUFACTURERS.

THE above Company Hereby Give Notice of their intention to approve THREE STANDARD PATTERNS of DRAWING and STOP COCKS in accordance with the following Clauses contained in Regulations confirmed by the Local Government Board on the 4th day of August, 1896:—

9. Every person who fixes or fits a Drawing-Cock or Stop-Cock, in connection with any pipe which is used or intended to be used for the purposes of the supply of water by the Company, shall cause such Drawing-Cock or Stop-Cock to be strong, well made, of hard brass or gun-metal, and of a pattern approved by the Company, and to have a loose screw-down valve not liable to be turned round on the seat; and (except where used for hot water) he shall cause such valve to be faced with leather: Provided that the Company shall approve of not less than three patterns of Drawing-Cock, and not less than three patterns of Stop-Cock, and not more than one such pattern of Drawing-Cock and not more than one such pattern of Stop-Cock shall be the subject of a patent; and this regulation shall not be deemed to require that any Drawing-Cock or Stop-Cock fixed or fitted as hereinbefore mentioned shall have been manufactured by any particular person.
10. Every person who fixes or fits upon any premises a Drawing-Cock or Stop-Cock, used or intended to be used for hot water in connection with any pipe which is used or intended to be used for the purposes of the supply of water by the Company, shall cause such Drawing-Cock or Stop-Cock to be similar to those mentioned in the foregoing regulation, except that the valve shall be of a form and the face be made of a material adapted for use in hot water: Provided that the Drawing-Cocks attached to boilers fixed in kitchens and other similar places may either be of the kind lastly described, or may be strong and well-made plug-cocks.

The Company invite Manufacturers to forward them Samples and Prices of Drawing-Cocks (including those adapted for Baths) on or before the 17th day of October, 1896, and the same will be paid for or returned free of cost after the selection has been made.

All Drawing-Cocks forwarded should have a label securely attached to them, stating the Sender's Name and Address, Weights of the various parts, number of Threads to the inch of the Screws, and the Details of the admixture of Metals composing such Cocks.

The Cocks are to be enclosed in a wooden box and forwarded to the Company's Office.

(Signed) JOHN AYRIS,
Managing-Director of the said Company.
Water-Works Office, Southend-on-Sea,
Sept. 21, 1896.

ISSUE OF STOCKS AND SHARES BY AUCTION
UNDER PARLIAMENTARY POWERS.

MR. ALFRED RICHARDS undertakes the issuing by Auction of GAS AND WATER SHARES under Parliamentary Powers.
He also holds MONTHLY SALES of GAS AND WATER SHARES at the Auction Mart, Tokenhouse Yard, E.C.
Terms for the issuing of Capital, and also for offering to auction Gas and Water Shares, and all Particulars relating thereto, may be had of Mr. Alfred Richards.
Offices: 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the Aldershot Gas and Water Company, the Executors of the late James Moss, Esq., and other Owners.
GAS AND WATER STOCKS, SHARES, AND DEBENTURES IN THE
Aldershot Gas and Water Company.
Brighton and Hove General Gas Company.
Barnet District Gas and Water Company.
West Ham Gas Company.
Hastings and St. Leonards Gas Company.
Eastbourne Gas Company.
Harrogate Gas Company.
South-West Suburban Water Company.
Dorking Gas Company, and
Sutton Gas Company.

MR. ALFRED RICHARDS will Sell the above BY AUCTION, at the Mart, Tokenhouse Yard, London, E.C., on Tuesday, Oct. 27, at Two o'clock precisely, in Lots.
Particulars at the AUCTION MART, and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By Order of the Directors.
500 SHARES IN
THE SOUTHEND WATER-WORKS COMPANY.

MR. ALFRED RICHARDS will Sell by AUCTION at the Mart, London, E.C., on Monday, the 19th of October, 1896, at One for Two o'clock precisely, 500 £10 FULLY-PAID SHARES in the above Undertaking, ranking for a maximum Dividend of 7 per cent. (the last Dividend on the same class of Shares having been at the rate of 5 per cent. per annum).
Particulars of the AUCTIONEER, 18, Finsbury Circus, LONDON, E.C.

Just Published, Crown 8vo., Cloth, 5s. net.
INFLAMMABLE GASES:
The Detection and Measurement of Inflammable Gas and Vapour in the Air.
By Professor FRANK CLOWES, D.Sc.,
With a Chapter on PETROLEUM VAPOUR by
BOVERTON REDWOOD, F.R.S.E.
London: CROSBY LOCKWOOD AND SON, 7, STATIONERS' HALL COURT, E.C.

Price 5s. per 100.
THE USE OF
GAS LIME IN AGRICULTURE.
By Dr. A. VOELCKER.
A 4pp. Leaflet for Distribution among Farmers and others.
LONDON: Walter King, 11, Bolt Court, Fleet St., E.C.

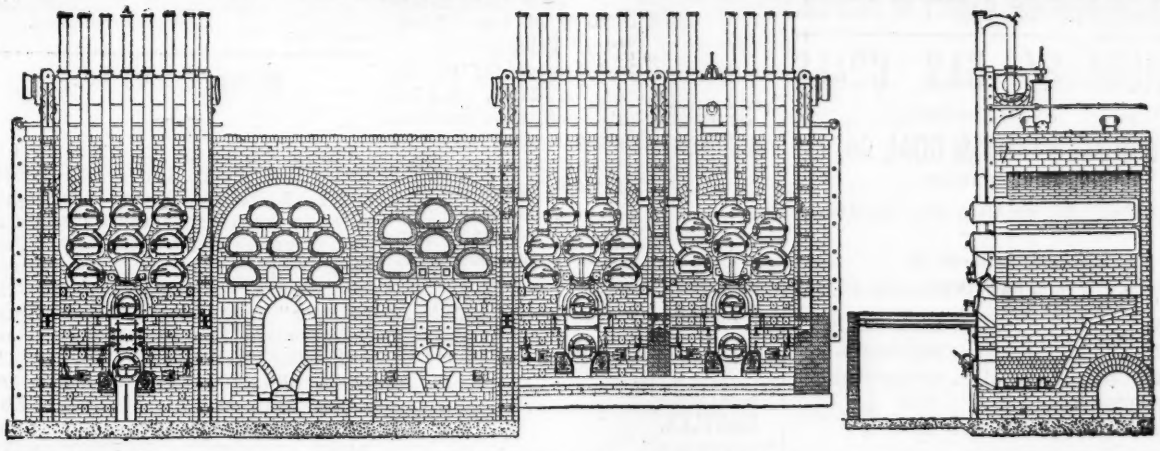
Price 6s., Cloth Bound, Bevelled Boards.
THE
GUIDE-FRAMING OF GASHOLDERS
AND OTHER PAPERS
CHIEFLY RELATING TO
STRAINS IN STRUCTURES CONNECTED WITH GAS-WORKS.
BY
F. SOUTHWELL CRIPPS, Assoc. M. Inst. C.E.
Reprinted from the JOURNAL OF GAS LIGHTING. *Fully Revised and Corrected by the Author, with many Additions.*
LONDON:
WALTER KING, 11, Bolt Court, FLEET STREET, E.C.

ARMSTRONG'S
PATENT
CANDLE SAFETY LAMPS.
Are a great improvement on Oil, giving a good Light, requiring little or no Cleaning, and when once lighted no further attention is necessary. The Candles are made to burn 5, 7, or 9 hours.
43, MANCHESTER STREET, GRAY'S INN ROAD, W.C.

TAR AND LIQUOR PURCHASED.
MAJOR & CO., Ltd.,
SUCCESSORS TO
JOHN CLARKSON MAJOR,
(Established 1851)
Tar Distillers and Manufacturing Chemists,
HULL & WOLVERHAMPTON.

UNEQUALLED.
Gas Companies are solicited to try Samples of the
MIRFIELD
BLACK BED GAS COAL.
Prices and Analysis on application.
MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

HISLOP'S PATENT REGENERATIVE SETTINGS OF GAS-RETORTS.



THESE SETTINGS ARE POSITIVELY UNRIVALLED IN PRODUCTIVE CAPACITY, DURABILITY, AND SIMPLICITY OF MANAGEMENT. RETORTS OF ORDINARY DIMENSIONS CARBONIZING FROM 18 TO 24 CWT. OF ENGLISH AND 21 TO 26 CWT. OF SCOTCH COAL PER 24 HOURS, DEPENDING UPON THE NATURE OF THE COAL, AND PRODUCING UP TO FULLY 13,000 CUBIC FEET PER MOUTHPIECE IN THE SAME TIME, AND WITH THE SMALLEST EXPENDITURE OF FUEL ATTAINABLE, AND RETURNING IN PROFIT THE ENTIRE COST OF ERECTION WITHIN TWELVE TO EIGHTEEN MONTHS; AND THUS REDUCING TO INSIGNIFICANCE THE INCREASED COST OF THESE SETTINGS OVER THE COMMON OR GENERATOR FURNACE SYSTEMS.

THESE SETTINGS ARE EXTENSIVELY ADOPTED, AND ARE ERECTED UPON THE SHALLOW AND STAGE FLOOR PLANS. THEY ARE ADAPTED TO ANY EXISTING ARRANGEMENTS, AND PERFECT SATISFACTION GUARANTEED. THE COMPOSITION OF FIRE-RESISTING AND OTHER SPECIAL FIRE-CLAY MATERIALS FURNISHED IS OF THE HIGHEST ORDER; AND THE SYSTEM AS A WHOLE, AS NOW PERFECTED, IS THE RESULT OF LONG EXPERIENCE AND CAREFUL STUDY OF THE PRINCIPLES OF GASEOUS FIRING.

Drawings and Tenders are furnished for the complete erection of Benches, including Retort and Bench Mounting of the most modern and approved description; or existing Ovens fitted up with the Patentee's arrangements.

Full Particulars may be had on application to the Patentee's Agents: **Messrs. JONAS DRAKE AND SON**, Retort Setters and General Carbonizing Engineers, Ovenden, Halifax, Yorkshire, Sole Agents for England, Wales, and Foreign Countries; **C. M. HAMILTON**, Retort Setter and Contractor, 5, Stuart Street, Shawlands, Glasgow, Agent for Scotland and Ireland; and to the Principal Agent, **R. F. HISLOP** (Son of Patentee), General Constructing and Carbonizing Engineer, Gas-Works, Paisley, N.B.

HISLOP'S PATENT HYDRAULIC MAIN SEAL-REGULATING AND TAR-EXTRACTING VALVE is a *Sine qua non.*
TO THE SATISFACTORY WORKING OF THE HYDRAULIC MAIN UNDER THE REGENERATIVE AS WELL AS OTHER SYSTEMS OF RETORTS. BEING LARGELY ADOPTED AND AFFORDING THE HIGHEST SATISFACTION.
The Patentee's SELF-SEALING CAPS FOR THE TOP OF ASCENSION-PIPES, and his "SPECIAL" FLUE PORT BOXES, are most important additions to his Carbonizing Plant.

SPENT LIMES NO LONGER WASTE PRODUCTS.
Under G. R. HISLOP'S Patents, all Spent Limes are effectively recovered at from one-third to one-half the cost of New Lime.
Further Information and Pamphlets from Principal Agent.

HEBBURN MAIN GAS COALS.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·4 candles.
Coke . . . . . 68 per cent.

For Prices, f.o.b. Ship or Delivered by Rail, apply to

THE WALLSEND & HEBBURN COAL COMPANY, LTD.
8 Lombard Street,
NEWCASTLE-ON-TYNE.

W. RICHARDSON, Fitter.

The Cheapest House in the Trade for
LEVER LOCKS
FOR
GAS-METERS.

Joseph Oakley & Co.
Excelsior Works,
WILLENHALL.

LONDONDERRY GAS COALS

FROM THE

MARQUIS OF LONDONDERRY'S COLLIERIES,

COUNTY OF DURHAM.

Available output up to 5000 tons per day.
Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by
Mr. John Pattinson, F.C.S., F.I.S.

FOR PRICES AND PARTICULARS, APPLY TO

S. J. DITCHFIELD,
SEAHAM HARBOUR, COUNTY OF DURHAM.

THORNLEY GAS COALS

WORKED BY THE

WEARDALE IRON & COAL Co., Ld.

OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by
Messrs. J. & H. S. PATTINSON, *May 28, 1895.*

Yield of Gas per Ton .	10,500 Cub. Ft.
Illuminating Power .	16·9 Candles.
Coke (of good quality) .	67·5 per Cent.
Sulphur	0·58 „
Ash	2·78 „

For Price, &c., apply to the

WEARDALE IRON & COAL Co., Ld.
QUAYSIDE, NEWCASTLE-ON-TYNE.

THOMAS TURTON AND SONS, LIMITED,

SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.

SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS,
ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.

LONDON OFFICE:
90, CANNON STREET, E.C.

THE INCANDESCENT GAS-LIGHT COMPANY, LIMITED
— *v* —
"DE MARE" COMPANY.

THE INCANDESCENT GAS-LIGHT COMPANY, LIMITED.
— *v.* —
"SUNLIGHT" COMPANY.

THE INCANDESCENT GAS-LIGHT COMPANY, LIMITED, HEREBY GIVE NOTICE, as follows:—

VALIDITY. The Company's Patent has been declared VALID ON ALL POINTS after a Fifteen-Day Trial.

NATURE OF INVENTION. The Invention was described by Mr. Justice Wills as a "PIONEER INVENTION."

SCOPE OF PATENT. The Patent HAS BEEN GIVEN A WIDE CONSTRUCTION; and it was held that the protection given by it was not confined to Mantles manufactured according to the particular prescriptions set out in the Specification.

SHAPE OF MANTLE. The Judge held that a Mantle, even if made in a different form or shape (such as the "De Mare" Fringe or Plume), IS STILL AN INFRINGEMENT of the "Welsbach" Patent.

"DE MARE" JUDGMENT. Judgment for an INJUNCTION, WITH FULL COSTS, has been given against the "De Mare" Incandescent Gas-Light System.

"SUNLIGHT" JUDGMENT. Judgment was given AGAINST the "Sunlight" Incandescent Gas-Lamp Company, Limited, on the question of the VALIDITY OF THE PLAINTIFFS' PATENT.

"SUNLIGHT" MANTLES. Last about 100 hours.

"WELSBACH" MANTLES. Last about 1000 hours.

"Sunlight" Mantles BURN DOUBLE THE GAS to produce the same candle power as the Incandescent Gas-Light Company's Mantles.

Users of "Sunlight" Mantles are applying to the Incandescent Gas-Light Company to REPLACE THEM BY THEIR OWN MANTLES.

WARNING. Users of the Incandescent Gas-Light Company's Mantles upon "Sunlight" Burners ARE INFRINGERS OF THE COMPANY'S PATENT, AND WILL BE AT ONCE PROCEEDED AGAINST.

COSTS. Certificates of the Validity of the Company's Patent have been granted both by Mr. Justice Romer and Mr. Justice Wills entitling the Company to Solicitor and Client Costs, which will, IN ALL CASES, BE RIGOROUSLY ENFORCED.

INFRINGERS. The Incandescent Gas-Light Company WILL TAKE PROCEEDINGS AGAINST ALL PERSONS INFRINGING THEIR PATENT WHETHER
MAKERS,
WHOLESALE DEALERS,
RETAILERS,
or
USERS.

Users of the Company's Mantles upon Burners not sold by the Company ARE INFRINGERS.

"LIMITED LICENSE" WARNING. Judgments have already been obtained against such users from Mr. Justice Chitty, Mr. Justice Stirling, Mr. Justice Kekewich, and Mr. Justice North.

FAITHFULL & OWEN,
11, Victoria Street,
Westminster.

Solicitors to the Incandescent Gas-Light Company, Limited.

April, 1896.

NOTICE.

The attention of the METEOR INCANDESCENT LIGHTING COMPANY, LIMITED, having been again called to the Advertisements inserted in various papers by the Incandescent Gas-Light Company, Limited, of Palmer Street, Westminster, to the effect that the "Meteor" Incandescent Gas-Lights are an Infringement of their Patents, and that they will bring Actions for Infringement against all persons found dealing in any manner with such Lights, the METEOR INCANDESCENT LIGHTING COMPANY, LIMITED, HEREBY GIVE NOTICE that they are advised that the "Meteor" Incandescent Lights in no way infringe any of the Patents of the Incandescent Gas-Light Company, Limited, that an action has been commenced to restrain such threats, and that they are PREPARED TO FULLY INDEMNIFY ALL PURCHASERS, DEALERS, AGENTS, and USERS of their Lights against any Legal Proceedings on the part of the Incandescent Gas-Light Company, Limited.

WILSON, BRISTOWS, & CARPMAEL,
1, Copthall Buildings, London, E.C.,
Solicitors to the Meteor Incandescent Lighting Company, Limited, of 35, New Broad Street, London, E.C.

Nov. 30, 1895.

Fcap. 4to, Cloth, price 7s. 6d., post free.

Practical Photometry.

By William Joseph Dibdin, F.I.C., F.C.S.

LONDON: Walter King, 11, Bolt Court, Fleet St., E.C.

TROTTER, HAINES, & CORBETT,

Brettell's Estate

FIRE-CLAY & BRICK WORKS,

STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.

Proprietors of

BEST GLASSHOUSE POT & CRUCIBLE CLAY.

SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: R. CULL, 84, OLD BROAD ST., E.C.

HOLMSIDE GAS COALS.

PRESENT DAILY PRODUCE OVER 4000 TONS.

LATEST ANALYSIS—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation.

Yield of Gas Per Ton . . 11,205 Cubic Feet.
Illuminating Power, $16\frac{7}{10}$ Stand. Sperm. Candl.
Coke (of good & pure quality) $13\frac{3}{4}$ Cwt. Per Ton.
Sulphur . . . . A little over 1 Per Cent.
Ash . . . . . Under 1 Per Cent.
Tar . . . . . 163 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor 108 Lbs. (Avoir.) Per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR PELTON GAS COALS.

PRESENT DAILY PRODUCE AVAILABLE 2500 TONS.

RESULTS OF DIFFERENT ANALYSES:—

Yield of Gas Per Ton . . 10,500 Cubic Feet.
Illuminating Power . 17 Stand. Sperm Candl.
Coke (of excellent quality) . $13\frac{1}{2}$ Cwt. Per Ton.
Sulphur . . . . . 1·13 Per Cent.
Ash. . . . . 1·34 Per Cent.
Tar. . . . . 180 Lbs. (Avoir.) Per Ton.
Ammoniacal Liquor $94\frac{1}{2}$ Lbs. (Avoir.) Per Ton.

The HOLMSIDE and SOUTH MOOR COAL-FIELD possesses *a very great quantity of the best Coal;* and, whilst other Coal-Fields are becoming exhausted, this one is only being opened out, so that *the quality* of both the HOLMSIDE COALS, and the SOUTH MOOR COALS *may be relied upon for all practical purposes.*

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,

HOLMSIDE AND SOUTH MOOR OFFICES,

NEWCASTLE-UPON-TYNE.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,

LIMITED,

NEWBATTLE COLLIERIES,

DALKEITH, N.B.

COKE-BREAKERS,

PRICES REDUCED.

(THOMAS & SOMERVILLE'S PATENT)

New Design, with two Cutting Rollers, making less Breeze than their old pattern.

GEORGE WALLER & CO.,

165, QUEEN VICTORIA STREET, E.C.,

And at STROUD, GLOUCESTERSHIRE.

BOLDON GAS COALS.

Worked by THE HARTON COAL CO., LTD.

Output about 3000 tons per day.

ANALYSIS—

Yield of Gas per ton . .	10,500 Cubic Feet.
Illuminating Power . .	16·9 Candles.
Coke	66·7 Coke.
Sulphur	0·86 Sulphur.
Ash	2·04 Ash.

Boldon Gas Coals are supplied under contract to

The Gaslight and Coke Company, South Metropolitan Gas Company, Commercial Gas Company, Imperial Continental Gas Association, European Gas Company, L'Union des Gaz (the Continental Union Gas Company), Crystal Palace District Gas Company, Danish Gas Company, Bombay Gas Company, San Paulo Gas Company, Alliance and Dublin Consumers' Gas Company, Ipswich Gaslight Company, Newcastle Gas Company, Sunderland Gas Company, South Shields Gas Company, and to many other Companies at Home and Abroad.

For Prices, &c., apply to the

HARTON COAL COMPANY,

LIMITED,

Newcastle-on-Tyne.

W. H. PARKINSON,
FITTER.

JAMES OAKES & Co.,

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

Wenlock Iron Wharf, 21 & 22, Wharf Road, CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

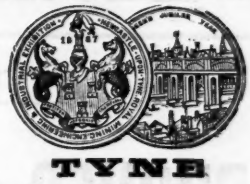
PIPES and CONNECTIONS, $1\frac{1}{2}$ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts and covers, and rendering leakage impossible.

Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887,

for

CANNEL & COAL.



TYNE

BOGHEAD CANNEL.

Yield of Gas per ton . . . . . 13,155 cub. ft.
Illuminating Power . . . . . 38·22 candles.
Coke per ton . . . . . 1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 17·8 candles.
Coke . . . . . 70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·3 candles.
Coke . . . . . 73·1 per cent.

For Prices and complete Analysis, apply to

THOS. W. DANCE & SONS,

COAL OWNERS, NEWCASTLE-ON-TYNE;

OR

E. FOSTER & CO.,

12, JOHN STREET, ADELPHI, LONDON, W.C.

PHILADELPHIA EXHIBITION, 1876;

ALSO SILVER MEDAL, PARIS.

The Highest Award for Gas-Retorts and other Goods in Fire-Clay has been awarded to KING BROTHERS for their Goods made from their renowned Stourbridge Fire-Clay.

KING BROTHERS,

Proprietors of

STOURBRIDGE CLAYS,

Manufacturers of

Fire-Bricks, Tank Blocks, Glass-House Bricks and Pots, Gas-Retorts, Crucibles in Clay and Plumbago, Gas-Oven Bricks, Bricks for Regenerator Furnaces and Hot-Air Stoves.

STOURBRIDGE, ENGLAND.

CRUCIBLE MANUFACTORY, 46, PENN STREET, CURZON STREET, BIRMINGHAM.

N.B.—Gas, Blast-Furnace, and Glass-House Bricks and Glass-House Pots always in Stock, or made on the Shortest Notice.

BOWENS' Ltd. Successors,
STOURBRIDGE.

MANUFACTURERS OF
BEST FIRE-BRICKS; INCLINED, HORIZONTAL, and SECTIONAL RETORTS; LUMPS, TILES, &c., of every description.
Established 1860.

OXIDE OF IRON.
NATURAL BOG ORE FROM OWN MINES.
Samples and Prices on application.
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TRADE MARK: "Compascum." Telegraphic Address: "FERRUM."

R. & A. MAIN,
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92, ALDERSGATE STREET, KINNING PARK,
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ALDER AND MACKAY,
MANUFACTURERS OF
IMPROVED WET AND DRY GAS-METERS
IN CAST-IRON AND TIN CASES OF THE HIGHEST EXCELLENCE.
ORIGINAL MANUFACTURERS OF DRY METERS IN CAST-IRON CASES.
STATION METERS, EXPERIMENTAL METERS, PHOTOMETERS, & PRESSURE-GAUGES, &c.

Results of Tests of Dry Gas-Meters (Section III.) of the Glasgow Philosophical Society's Gas Exhibition, as per London "Gas Journal," May 10, 1881.

	ALDER & MACKAY.	W. & B. Cowan.	G. Glover & Co.	James Keith.	D. B. Peebles & Co.
Total of Fast Tests	47·2	6·9	33·6	62·3	53·7
Total of Slow Tests	25·3	117·4	43·1	31·4	38·5
	72·5	124·3	76·7	93·7	92·2

Descriptive Circulars, Price Lists, and Full Particulars forwarded on application.
NEW GRANGE WORKS, EDINBURGH.

GASEOUS FIRING A SPECIALTY.
Telegraphic Address: "DRAKESON, HALIFAX."
Telephone No. 43. HALIFAX EXCHANGE.
GAS ENGINEERS. CONTRACTORS.
RETORT SETTERS. FURNACE BUILDERS.
IRONFOUNDERS. &c. &c.
SOLE MAKERS OF "MITTON'S" PATENT SELF-SEALING RETORT-LID.
SOLE MAKERS OF "SETTLE'S" PATENT COMBINED SEAL-REGULATING FLUSH-VALVE.
JOMS DRAKE & SON.
SOLE AGENTS For "HISLOP'S" PATENT REGENERATIVE FURNACES. FOR ENGLAND, WALES & ABROAD.
OVENDEN, HALIFAX.
LONDON OFFICE; 60, QUEEN VICTORIA ST., E.C.

JOHN BROWN & CO., LTD., SHEFFIELD.

Proprietors of

ALDWARKE MAIN, CAR HOUSE & ROTHERHAM MAIN COLLIERIES, NEAR ROTHERHAM.

ALDWARKE MAIN GAS COAL

Analysis: 12,600 Feet of 19-Candle Gas per Ton.

Value in Pounds of Sperm, 820·80.

VERY FREE FROM IMPURITIES.

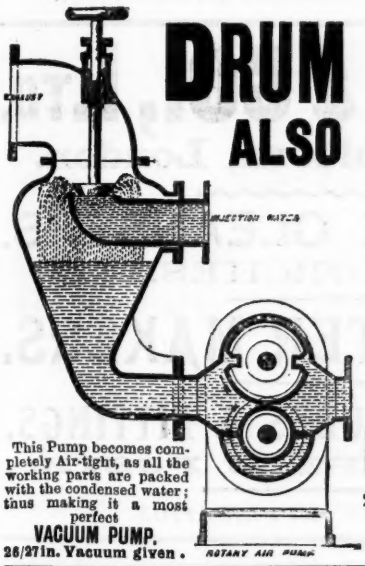
TELEGRAMS: "ATLAS, SHEFFIELD."

"The Force of the Piston Pump with the Capacity of the Centrifugal combined."

JOHNSON'S PATENT

DRUM PUMP AND EXHAUSTER

ALSO VACUUM PUMP AND CONDENSER.



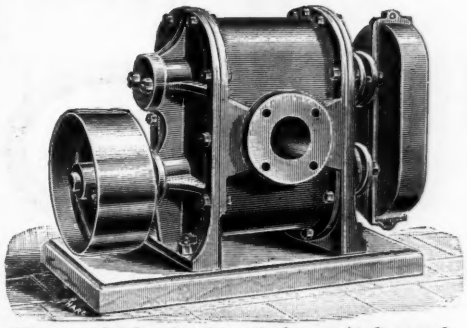
This Pump becomes completely Air-tight, as all the working parts are packed with the condensed water; thus making it a most perfect VACUUM PUMP. 26/27in. Vacuum given.

No Priming, Valves, or Frictional Working Parts.

The Pump of the future for quickly and economically moving large Bodies of Water, Semi-fluid, &c.

DRUM ENGINEERING Co.

27, CHARLES ST., BRADFORD.



Blowers and Exhausters guaranteed, even at a slow speed, to give a working pressure of 2 lbs. and upwards, and this without losing power by creating frictional Heat.

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CUTLERS PATENT TUBULAR GAS CONDENSER SUITABLE FOR GASWORKS OF ALL SIZES, AND FOR ANY CLIMATE OVER 100 ERECTED

MAKERS OF GASHOLDERS OF EVERY SIZE AND TYPE

HUNT'S PATENT WASHER. IS THE ONLY APPARATUS NECESSARY BETWEEN THE CONDENSER & PURIFIERS. IT REQUIRES NO MOTIVE POWER

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A SPECIALTY STEEL TANKS FOR GASHOLDERS AND OIL STORAGE.

IMPROVED SYSTEM OF CARBURETTED WATER-GAS PLANT PARTICULARS ON APPLICATION.

CUTLER'S FREEZING PREVENTER IS THE BEST APPLIANCE FOR PREVENTING FORMATION OF ICE IN GASHOLDER CUPS. IT IS IN USE AT MANY IMPORTANT WORKS IN ENGLAND, GERMANY, AUSTRIA, AND AMERICA

ELECTRIC FITTINGS. DYNAMOS MOTORS.

THE "COOMBE" DRAUGHT SCREEN.
Protection granted,
1896, No. 2075.

THE "COOMBE" DRAUGHT SCREEN FOR INCANDESCENT BURNERS.

ADVANTAGES.

1.—Prevents draughts of cold air from ascending the Chimney, and thereby lengthens the life of Chimney and Mantle.
2.—Prevents attempts to light spills, &c., in Bars and Restaurants, by which many Mantles are destroyed.
3.—Presents an ornamental appearance, which greatly adds to the beauty of the Burner.
4.—Prevents "Lighting-Back," and keeps out dust and dirt.

SOLD EVERYWHERE.

Wholesale of the Patentees,
ALFRED ARCULUS & CO., GLASS MANUFACTURERS, BIRMINGHAM.
"An Incandescent Burner without a Draught Screen is like a Man without a Collar."

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GAS SERVICE CLEANSERS.
LAMP TORCHES.

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WROUGHT-IRON TUBES & FITTINGS.
STREET LAMPS & POSTS.

PRICE LISTS ON APPLICATION.

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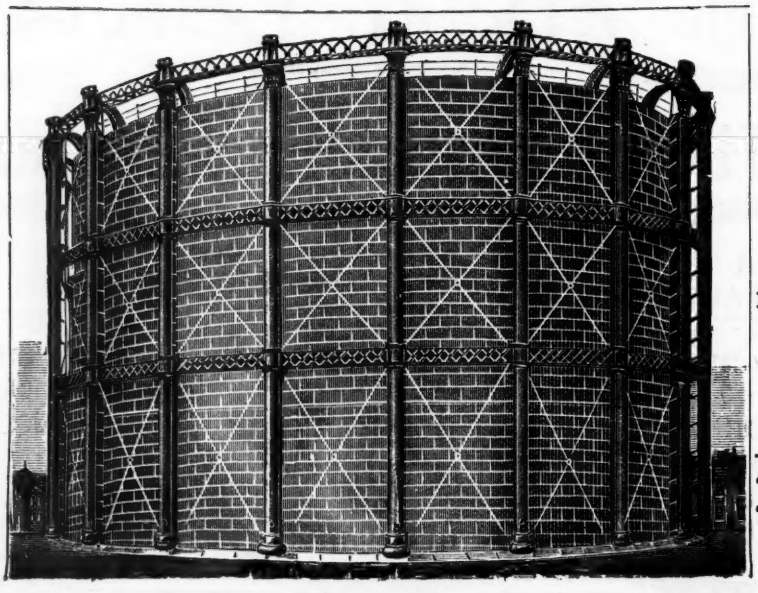
PURIFIERS, SCRUBBERS, CONDENSERS, WASHERS, TANKS, VALVES,
PIPES, LAMP PILLARS, RETORT-FITTINGS, ETC.

ALSO ALL KINDS OF
STRUCTURAL IRON
AND STEEL WORK.
BRIDGES,
ROOFS,
PIERS, ETC.



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ALEX. C. HUMPHREYS, M.Inst.C.E. A. G. GLASGOW, M.E.

MESSRS. HUMPHREYS & GLASGOW

Have constructed their EUROPEAN type of

CARBURETTED WATER-GAS PLANT

At the following Gas-Works:—

Copenhagen	700,000 Cub. Ft.	Brighton	1,500,000 Cub. Ft.
Belfast	1,700,000 „	Preston	1,500,000 „
Glasgow	300,000 „	Southport	750,000 „
Brussels	700,000 „	Bath	1,000,000 „
Liverpool	3,500,000 „	New York	1,200,000 „
Tottenham	750,000 „	Newburgh, N.Y.	350,000 „
Santiago	400,000 „	Tottenham (Second Contract)	750,000 „
Swansea	750,000 „	St. Joseph, Mo.	750,000 „

And have now under Contract:—

Belfast (Second Contract)	4,500,000 Cub. Ft.	Stockton-on-Tees	500,000 Cub. Ft.
Shanghai	225,000 „	Stockport	500,000 „
Winchester	200,000 „	Norwich	1,000,000 „
Hoylake	125,000 „	Guildford	350,000 „
Manchester	3,000,000 „	Syracuse, N.Y.	850,000 „
Brussels (Second Contract)	700,000 „	Bordentown, N.J.	125,000 „
Holyoke, Mass.	600,000 „	Lea Bridge	350,000 „
Edinburgh	2,000,000 „	Newburgh, N.Y. (Second Contract)	250,000 „

In addition to which the previous Installations of The Gaslight and Coke Company under this System have a total capacity of 10,000,000 cubic feet per diem.

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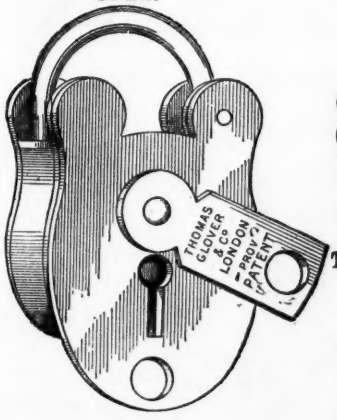
[ESTABLISHED 1844.] **ORIGINAL MAKERS.** [ESTABLISHED 1844.]

LONDON, 1851. NEW YORK, 1853. PARIS, 1855. LONDON, 1862. DUBLIN, 1865. PARIS, 1867.

THE SIX MEDALS AWARDED TO THOMAS GLOVER'S PATENT DRY GAS-METERS;

The latter being the Highest Award for Dry Gas-Meters at the Paris Exhibition, 1867. Since then we have not Exhibited FOR PRIZES.

OPEN.



THOMAS GLOVER & CO.'S

PATENT

SECURE PADLOCK

Prevents Tampering with the CASH-BOXES OF PREPAYMENT METERS.

The Padlock is Sealed by means of a Lead Eyelet, which is impressed with Company's private mark. Eyelets easily fixed and removed by Company's Collector.

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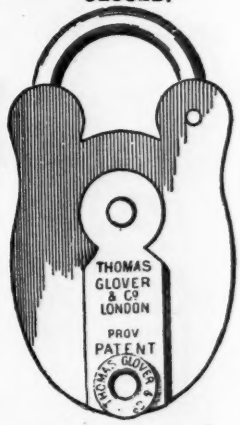

Telegraphic Address: "GOTHIC LONDON." Telephone No. 6725.

THOMAS GLOVER & CO., LTD.,

DRY GAS-METER MANUFACTURERS,

214 to 222, ST. JOHN ST., CLERKENWELL GREEN, LONDON, E.C.

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PATENT AUTOMATIC MACHINERY

FOR

CHARGING AND DRAWING GAS-RETORTS

SIR WILLIAM ARROL & CO., Ltd., Sole Makers,

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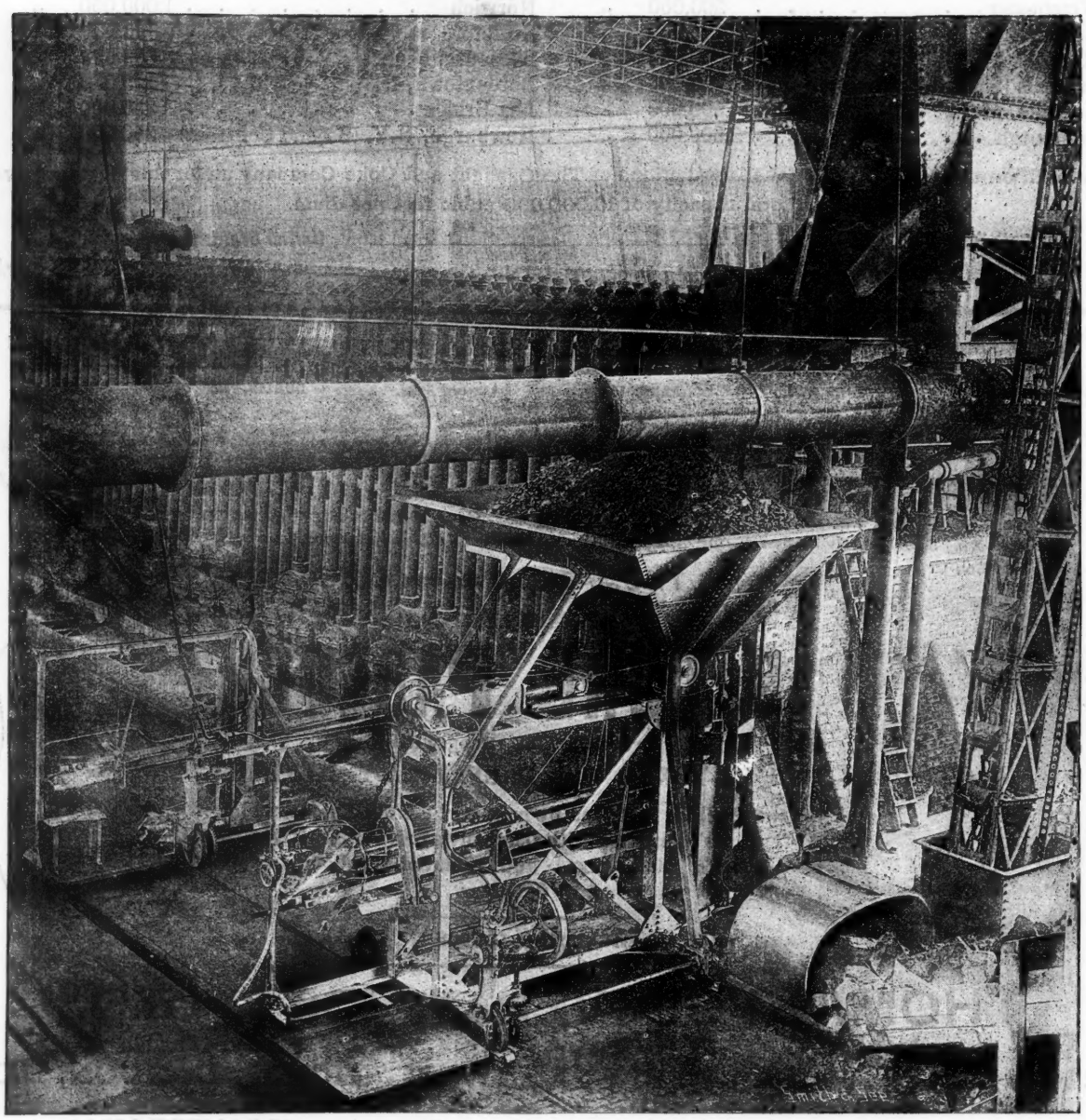
Plans and Estimates furnished on application.



The above engraving shows the interior of a Retort-House at the Tradeston Gas-Works, Glasgow, where the Machines have been at work since the beginning of 1893, drawing and charging **960 Retorts every 24 hours. 102 Drawing-Machines and 70 Charging-Machines are at work, or in course of construction.**

JAMES MILNE & SON, LTD.,

MILTON HOUSE WORKS, EDINBURGH.

60, HOLBORN VIADUCT, LONDON. | 111, ST. VINCENT STREET, GLASGOW. | 48, WELLINGTON STREET, LEEDS.

MILNE'S PATENT

PREPAYMENT DRY METER.

MOST COMPACT ATTACHMENT IN THE MARKET.

SAME HEIGHT AS AN ORDINARY METER.

CAST-IRON ATTACHMENT COVER WITH EXTRA LARGE MONEY-BOX, WHICH IS WITHDRAWN WHILE OPENING DOOR.

ABSOLUTELY POSITIVE IN ACTION.

THE WHOLE MECHANISM ALWAYS IN GEAR.

NO SPRINGS TO GET OUT OF ORDER.

NO PAWLS TO SLIP OUT OF GEAR.

ACCURACY IN PRICE-CHANGING SECURED.

400 Cub. Ft. CAN BE PAID FOR AT ONE TIME.

R. DEMPSTER & SONS, LD.

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GENERATOR & REGENERATOR FURNACES & SETTINGS

GIVING VERY BEST RESULTS.

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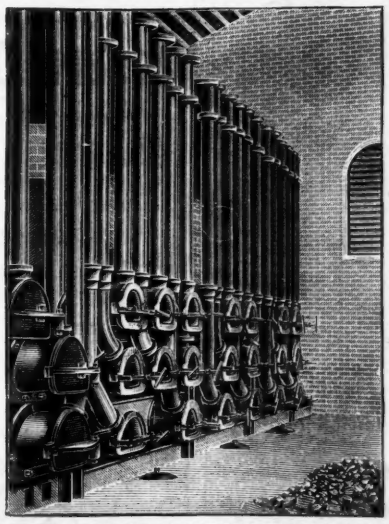
This COMPANY write—

"Mr. Chester's Furnaces and Settings you have erected for us work exceedingly well. Splendid heats under easy control. Nearly **50** per cent. less Coke used for Fuel than formerly. Very convenient for Sunday stopping. Work done in a thorough manner, to our entire satisfaction."



MATLOCK BATH.

Mr. LISTER writes that—

"The result of using Chester's Furnace and Setting for first Six Months of 1896 was to produce 26,000 cubic feet more gas, using 35 tons less coal, and having 171 tons more coke for sale, compared with same period of 1895."

ILLUSTRATION OF Mr. CHESTER'S REGENERATOR FURNACES AND SETTINGS RECENTLY ERECTED BY US AT CLEETHORPES, ABOUT WHICH Mr. BROCKWAY WRITES—

"Can make 8000 to 9000 per mouthpiece easily with **Mr. Chester's Regenerators** you have erected for us. Fuel Consumption much less than with our Generators. Heating of Retorts very even. Very well pleased with working. Results exceed expectations."

Price 21s., Post Free,

PRECEDENTS IN
PRIVATE BILL LEGISLATION
AFFECTING GAS AND WATER UNDERTAKINGS, 1879-90.
Compiled by E. H. STEVENSON & E. K. BURSTAL.

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STOURBRIDGE.

MANUFACTURERS OF
BEST FIRE-BRICKS, GAS-RETORTS,
LUMPS, TILES, AND ALL ARTICLES IN FIRE-CLAY.
Proprietors of Best Glasshouse Pot, Crucible, and other Stourbridge Clays.

MANUFACTURERS OF GLASSHOUSE POTS AND CRUCIBLES OF EVERY KIND.
ESTABLISHED 1838.

WILLIAM INGHAM & SONS,
Incorporated with the Leeds Fire-Clay Company, Ltd.,
WORTLEY FIRE-CLAY WORKS,
Near LEEDS,

Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—
1. Smooth interior, preventing adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.

PATENT
MACHINE-MADE GAS-RETORTS.

THE THAMES BANK IRON CO.
UPPER GROUND STREET, LONDON, S.E.,
SUPPLY FROM STOCK
CAST-IRON RETORTS,
AND ALL KINDS OF GAS-WORKS APPARATUS.
SOCKET-PIPES FOR GAS OR WATER PURPOSES.
FLANGE PIPES FOR STEAM.
Sole Manufacturers of LYON'S "PATENT" GAS-MAIN SYPHONS.
AGENTS FOR
ATTERTON'S PATENT APPARATUS for CHARGING RETORTS.

MAKERS OF
CLAYTON, SON & Co LTD LEEDS.
ALL KINDS GAS PLANT
12,100,000 CUB FT CAPACITY.
COMPLETED IN 12 MONTHS
GASHOLDERS
OUR SPECIALITY
IT IS 300 FT DIAM. HAS SIX LIFTS, EACH 30 FT DEEP. HAS NO ROPES OR SPIRAL GUIDES.
MAKERS OF THE LARGEST GASHOLDER IN THE WORLD
HIGH CLASS BOILERS &c
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GIRDERS, ROOFS, & ALL KINDS OF
STRUCTURAL IRONWORK.

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Telegraphic Addresses: "GAS, LEEDS," "ECLARAGE, LONDON."

Victory over Welsbach Incandescent Light.
For our first-class Burners at 10d. } WARRANTED, IN WRITING, TO
For our first-class Mantles at } VIOLATE NO OTHER PATENTS.
ALL ARTICLES FOR INCANDESCENT LIGHT GOOD & CHEAP.
Send for Price Lists.
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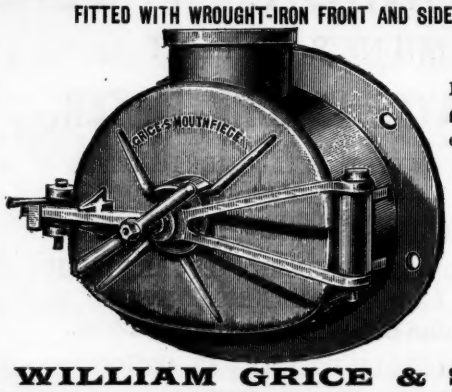
GRICE'S SELF-SEALING MOUTHPIECE,
FITTED WITH WROUGHT-IRON FRONT AND SIDE LEVERS.



Patterns for Oval, ⌂, and Rounds, or all sized Retorts.

Catalogue and Price on application.

WILLIAM GRICE & SONS,
FAZELEY STREET WORKS, BIRMINGHAM.

The Climax of Regenerative Gas Lighting!!

THE
"VERTMARCHE"
A 280-CANDLE POWER
PLAIN IRON LAMP,
CLASS A— 55/-
LIGHT for LIGHT
less than half the price of any other Regenerative Lamp.
Manufactured in England.
HENRY GREENE & SONS,
153 & 155, CANNON STREET,
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PARTICULARS AND PRICES FREE. AGENTS WANTED.

JOSEPH CLIFF & SONS,
INCORPORATED IN
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LONDON OFFICES & DEPÔTS:
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MACHINE-MADE RETORTS

Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.
RETORTS CAREFULLY PACKED FOR EXPORT.
Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

GODDARD, MASSEY, & WARNER'S

IMPROVED

Sulphate of Ammonia Apparatus.

The most successful and approved Apparatus known up to the present time.

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The Apparatus has been supplied to the following Firms—

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ANIMAL CHARCOAL CO., Limited SHADWELL.
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And to the following Gas Companies and Corporations—

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ALTRINCHAM.	PRESCOT.	SOUTH SHIELDS.
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ST. ALBANS.	LEICESTER.	IPSWICH.
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CHARGING OR COAL MEASURING TRUCKS.

FOUR CENTRE SIDE TIP WAGGON.

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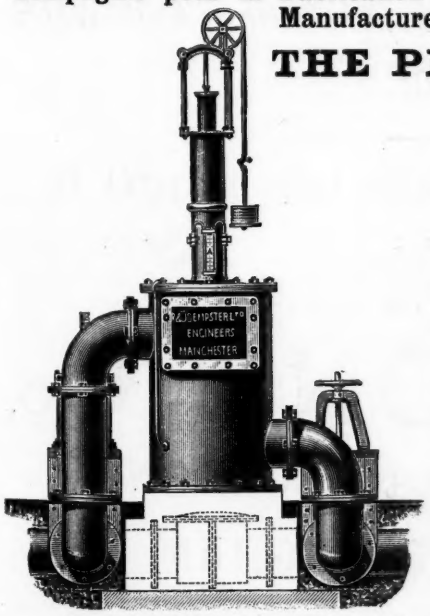

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[See also Advt. p. 632.

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